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STUDIES ON THE TREMOR-RIGIDITY SYNDROME: I. SURGICAL TREATMENT OF HUMAN SUBJECTS.¹

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Terminology.

"PARALYSIS AGITANS", "Parkinson's disease", "Parkinson's syndrome", and "Parkinsonism" are terms which have become so ingrained into our medical nomenclature that one feels it is of little use attempting to alter them at this stage. James Parkinson described the condition in his essay on "The Shaking Palsy" in 1817, but he acknowledged previous descriptions of the tremor by such men as Galen, Sylvius (de le Boë), Junker, Cullen and Boissier de Sauvages, the latter of whom also described the festinant gait (*scelotyrbe festinans*). Since these original accounts varying descriptions of the syndrome have been published by many clinicians. It is somewhat difficult to find a suitable title for the so-called "Parkinson's syndrome", as the symptoms that may occur are many and varied, and depend on an as yet ill-defined basis. The two outstanding features of the disease are tremor and rigidity, one or both of which occur in every case. Other symptoms, which will be described later, may develop as the disease progresses, but they rarely occur in the initial stages. For this reason the term "tremor-rigidity syndrome", following the suggestion of Fulton (1943), has been selected to describe the condition with which we are dealing.

¹ Read at a meeting of the New South Wales Branch of the British Medical Association on May 27, 1948.

Historical Features.

For some years I have been interested in the possibility of attacking this problem at the cortical level, particularly in view of the preliminary work that has been carried out by other investigators. The results of an operation on dogs suffering from a tremor-rigidity syndrome resembling that found in humans are presented as a separate paper in this journal. The results that have been obtained with the human subjects have, in several instances, been rather remarkable, and on the surface would appear to be contrary to present neuro-physiological teaching. It must be remembered, however, that one is removing an area of cerebral cortex in cases in which there is disease or destruction of cells of several cerebral structures, even to the cortex itself. This must undoubtedly play a part in the extraordinary procession of events which have been noted to follow cortical extirpation, and which do not occur when the same area is removed in cases of neoplasm or epileptogenic foci in which the deeper structures are not diseased.

In the present century several procedures have been carried out at different levels of the central nervous system in an attempt to relieve the symptoms of the tremor-rigidity syndrome. During the past fifteen years these surgical attacks have become more numerous and varied and have produced equally variable results. It cannot be said that, as yet, there is any possibility of surgical "cure" of the tremor-rigidity syndrome; but a review of the literature suggests that a gratifying reduction in some of the patients' symptoms can be produced by surgical means.

The surgical treatment of this condition may be said to have been initiated by Sir Victor Horsley (1909), who resected portion of the precentral cortex in a boy suffering from athetoid tremor of the left hand. He obtained cessation of the spasmodic movement, but there also occurred considerable loss of motor function, probably due to removal of, or damage to, areas 4 and 4S. After Horsley's introduction there was little advance in the surgical treatment of the disease until early in the fourth

decade of this century, when attention was again focused on the possibility of relieving these distressing symptoms by surgical means. Pollock and Davis (1930) cut the posterior spinal roots without any benefit. The *fasciculus cuneatus* was sectioned by Puusepp (1930) and later by Rizzatti and Moreno (1936) with some reduction in rigidity, but without effect on the tremor. Antero-lateral cordotomy was performed by Foerster and Gagel (1932), by Putnam (1933) and by others; but although they obtained some benefit in cases of athetosis, there was no improvement in cases of the tremor-rigidity syndrome. Later, Putnam (1942) reported substantial relief in cases of "paralysis agitans" following high cervical section of the lateral pyramidal tract; but this procedure was accompanied by a high mortality rate and is rather difficult technically. Delmas-Marsalet and van Bogaert (1935) attacked the caudate nucleus in a case of "paralysis agitans", reporting that the rigidity was greatly reduced, but that the tremor became worse, and unfortunately the patient died on the tenth post-operative day. Meyers (1942) has suggested section of the head of the caudate nucleus or of the *ansa lenticularis*, and has carried out this procedure in a number of cases of "paralysis agitans". Most of these subjects have shown some improvement following the operation, and one in particular went so far as to win a beauty competition some time later. It is of interest to note that in his approach to the caudate nucleus Meyers sectioned the precentral cortex along a line through the anterior suppressor band (area 4S) which lies between areas 4 and 6 (*vide infra*). During this procedure there was no alteration in the tremor, nor did the tremor vary when he undermined the cortex corresponding to the premotor area. Similar operations have also been carried out recently by Jefferson Browder, with results that are as yet not assessable.

Surgical extirpation of the precentral cortex has been carried out by various investigators, such as Bucy and Buchanan (1932), Bucy and Case (1939), Bucy (1942), Garol and Bucy (1944), Klemme (1942), and others, while Aring and Fulton (1936) have removed the precentral cortex experimentally for relief of the tremor. Bucy and Case reported that the tremor was abolished or greatly relieved by this procedure, but that the spastic paresis, when present, was not markedly affected. Klemme claims to have carried out premotor resection in a large series of cases with a high percentage of complete abolition of all the preexisting symptoms. Unfortunately, Klemme's brief reports are mainly statistical and do not include details of his surgical technique; nor does he offer any convincing data on the pre-operative and post-operative condition of his patients. Until he can present some more reliable information, his claims cannot be accepted. Various orthopaedic procedures are still performed in cases of the tremor-rigidity syndrome, but these are purely palliative and do not alter the symptomatology of the disease.

Etiology.

The aetiological basis of this syndrome is still virtually unknown, although it has been attributed to several factors such as encephalitis, toxins from septic foci or metal poisons, head trauma, vascular changes associated with advanced age or following some cerebral vascular accident, and cerebral neoplasm. It has not been conclusively shown whether these can act as true primary factors or merely as contributing factors, or whether they are purely coincidental. In the present series it is notable that the majority of patients gave no history of any pre-existing illness or injury. Occasionally there has been a history of definite encephalitis, and a few have remembered a vague head injury some time prior to the actual onset of symptoms. In these cases the time element seems to be too inconstant, sometimes amounting to years, for one to lay the blame at any one particular door. Again, one is justified in raising the question that, if the above are true primary factors, why is there such a long delay before the onset of the tremor-rigidity syndrome? And why should the syndrome follow such a constantly progressive course, even though such a primary causative factor has long ceased to exist? Histo-pathological studies suggest the possibility of an underlying vascular basis,

in which case the above factors could be contributory or initiating factors, or mere red herrings that have crossed the trail. However, this involves another research problem and cannot be discussed fully in this communication. On the whole this syndrome is rather rare, constituting somewhat less than 1% of all neurological diseases. It is slightly more prevalent in the male, and the onset usually occurs in middle or late middle life, although it may occur at any time from adolescence to advanced age.

Symptoms and Signs before Operation.

1. Tremor.

Tremor is one of the two prominent symptoms and is usually the first to appear. It begins in a hand or foot and becomes more pronounced until it involves the whole limb. It then usually spreads to the other ipsilateral extremity and finally to the opposite side of the body. In the early stages the tremor ceases on intentional movement, so that, although it may be rather disconcerting, it does not interfere with the patient's movements. As the disease progresses the tremor becomes more pronounced, and finally it does not stop on intentional movement, so that the patient spills his food and cannot perform various fine movements. In the later stages the tremor often extends to involve the lower jaw and the tongue, and occasionally the head and neck. It is frequently reduced during restful periods, as a rule abolished during sleep and usually aggravated during periods of excitement or emotional upset. In the early stages the hand movements develop into the characteristic "pill-rolling" tremor; but later the tremor may increase in amplitude and may involve the whole arm, so as to become so violent that it literally shakes the whole body and even the patient's bed.

2. Spasticity.

Spasticity is very often the initial symptom, although the patient rarely notices it as much, being more likely to complain of awkwardness and slowing of movement. Although it is not usually so prominent as tremor, it is, when pronounced, far more disabling, and it is probably directly or indirectly responsible for most of the other symptoms associated with this syndrome. Muscle tone in the affected part slowly increases, and may progress to such a stage that it may be practically impossible for the examiner to move a certain joint, and fixed contractures may occur in severe cases. The deep reflexes of the affected extremities are increased. In the earlier stages this increase is obvious; but later the deep reflexes may be difficult to elicit owing to the greatly increased muscle tone which tends to bind the joint, giving the impression that the reflexes are normal or reduced. With care and patience, however, and by putting the patient into as relaxed a position as possible, one can always obtain a hyperactive response.

3. Fine Movements.

One of the early symptoms is difficulty and slowness in carrying out fine movements. This extends to involve coarser movements until any complicated movement is impossible. Writing becomes smaller (*micrographia*), and eventually the patient cannot even sign his name. This disability is undoubtedly due to increased tone in the muscles involved.

4. Weakness.

It is very difficult to assess the true value of weakness even in the advanced stages of the disease. Patients not infrequently complain of it as the initial symptom and usually recognize it at some phase, and yet, on examination, the handgrip and other movements are strong, and as far as one can judge, normal. In the advanced stages, when the spasticity is marked, this weakness is more apparent. And yet, in view of this work, one feels that this weakness is more apparent than real, and due to something more than loss of contractile power of, or loss of central innervation to, the muscle fibres. One feels that it is really the slowness of movement due to failure of the opposing muscles to relax, and that this is translated by the patient as weakness.

5. Cranial Nerves.

Ocular Movements (III, IV and VI).—The muscles of the eyes may be involved with resulting difficulty in convergence and accommodation. There may be some slowing of movement of the eyeballs, and conjugate lateral deviation may be possible only when the eyelids are blinked.

Mastication (V).—There may be considerable difficulty in chewing food if the tone increases in muscles supplied by the fifth motor nerve. In one case of this series the lower jaw sagged downwards as soon as the subject stopped talking or eating, so that her mouth was continually open.

Facial Expression (VII).—One of the most prominent features of the syndrome is the increasing loss of facial expression, eventuating in the familiar "poker face" or "dead pan". One also notices that the natural facial wrinkles become ironed out, so that the patient has an appearance younger than his years. These features are due to tightening up of the muscles of expression as the tone increases. Actually the internal emotions are little affected. It is merely a difficulty in transmitting this emotion into a facial expression. Even deep sorrow may be evidenced by little more than an excessive secretion of tears.

Speech and Swallowing (VII, IX, X and XII).—Speech usually becomes affected in the fairly early stages, owing to impairment of movement of the muscles of the lips, the tongue and the vocal cords. The voice becomes less modulated until it consists purely of a monotone. Later it becomes slurred and indistinct, until finally it becomes completely inarticulate and reduced to a mere unintelligible sound.

As the muscles of the tongue and pharynx become involved the patient has difficulty in shifting food to the back of his mouth; in very advanced cases there is difficulty in swallowing, and eventually the diet may be confined to liquids.

Sternomastoids and Trapezi (XII).—Tone increases in the sterno-mastoids and trapezii, as in other muscles of the body. In the later stages the sterno-mastoid muscles become very spastic and stand out in the neck as rigid cords. This is undoubtedly the cause of the semiflexed position of the cervical part of the spine in advanced cases.

6. Sialorrhœa.

In practically every case in which the condition has advanced beyond the primary stages, there is a complaint of increased salivation. One feels, however, that it is more apparent than real, and that it is due mainly to the difficulty in performing the various facial, lingual and pharyngeal movements necessary to collect the saliva on to the tongue and swallow it. If this is true, then this symptom is also the result of increased muscle tone.

7. Posture.

In the more advanced stages the whole body adopts a flexed posture. This may increase until the afflicted person can support himself only by placing his hands on his knees or by using a stick or crutches to assume the erect position. This attitude is undoubtedly the result of increased muscle tone. The forward flexion is probably due to bilateral contraction of the sterno-mastoid muscles, causing flexion of the head on the chest. The weight of the head, and later of the upper part of the torso, probably adds its effect and helps to increase the forward flexion when the patient is in the upright position.

8. Gait.

The gait gradually becomes characteristic of the syndrome. The affected arm swings less during walking, until eventually it is held fixed and semiflexed by the side. As the legs become affected the patient notices that he is dragging one or both feet. The hand and trunk assume a flexed posture, and the patient later walks forwards with short shuffling steps. In some cases this may become faster until he develops a jog-trot, as if he were trying to catch up with his centre of gravity. On occasions

he may even have to run into some solid object to stop himself. Even in moderately advanced cases the patient may have difficulty in turning round, and in some cases if the patient straightens up he has to walk backwards (retropulsion) to prevent himself from falling. As the spasticity increases walking becomes increasingly difficult, and possible only with assistance, until finally the subject becomes completely bedridden. This abnormal gait is the result of increased muscle tone.

9. Pain.

Pain is not an uncommon symptom, but it is not as a rule severe. It is usually located in the larger groups of muscles in the shoulder and thigh regions and is described as a constant ache. This has been incorrectly related to arthritis, although arthritic changes do occur in very advanced cases, probably owing to immobilization of the joint by the surrounding spastic muscles. The pain is more probably due to prolonged muscle tension related to the pain associated with muscle fatigue, particularly as it is noticed mainly towards the end of the day, and is relieved by a night's rest.

It will be noted that it has been suggested that the symptoms described under paragraphs 3 to 9 inclusive, including symptoms related to the cranial nerves, are directly or indirectly associated with increased muscle tone—that is, with rigidity. If this is so, the term "tremor-rigidity syndrome", suggested by Fulton, should be accepted as accurately describing the condition. The only symptom apart from the two above-mentioned is the oculogyric crisis, which is comparatively rare and as yet not entirely understood.

10. Oculogyric Crisis.

The oculogyric crisis is an uncommon and curious phenomenon that is usually associated with some form of the tremor-rigidity syndrome. The attacks consist of forced deviation of the eyes upwards, downwards or laterally. They frequently occur after fatigue or some emotional upset. The attacks may occur from a few times per day to once in three or four weeks. The patient has no control over the phenomenon, which may cease spontaneously or after a period of sleep, and the attacks are extremely distressing.

11. Mental Status.

The most tragic feature of this syndrome is that, even in the advanced stages, the patient remains mentally alert. One often finds some emotional instability, such as irritability and bouts of temper and depression; but this is quite understandable when one considers that all the patient has to do is to watch his own disease slowly progress to an inevitable conclusion.

12. Sensation.

Sensation has not been materially affected in any case in this series.

13. Weight.

There is usually a history of some loss of weight as the disease progresses.

Neuropathology and Neurophysiology.

Histo-pathological studies have revealed changes in many parts of the brain, from the cerebellum, through the brainstem and basal ganglia, even to the cortex itself. There are many publications available to the reader setting out the known pathological changes associated with this syndrome. As the condition cannot be regarded as a "killing" disease, the amount of autopsy material available for histological study is limited, and this undoubtedly accounts largely for our present lack of knowledge on the subject.

Much has also been written regarding the neurophysiological aspects of the syndrome; but here again the lack of suitable material has tended to hinder satisfactory progress. The results of operation in cases of the canine form of the tremor-rigidity syndrome and subsequent histological studies have provided some valuable informa-

tion which, it is hoped, will provide added stimulus for research in this field. As this publication is merely a preliminary report regarding the clinical results of operation, it is not practicable to include any prolonged discussion on the neuropathology or neurophysiology of the syndrome.

Surgical Procedures.

Pre-Operative Investigations.

In each case in which the subject has been accepted for operation, besides the taking of a complete history and a full examination, seven special investigations have been carried out. (These have been made mainly for their comparative value with the same investigations after operation, especially with a view to maintaining a normal fluid balance.) The seven investigations are as follows: (i) estimation of the circulating blood volume; (ii) a complete red and white cell count, blood film examination and blood grouping; (iii) a haemoglobin estimation; (iv) a haematocrit estimation; (v) serum protein, chloride and phosphorus estimations; (vi) an electroencephalographic recording; (vii) coloured cinematography.

The blood estimations are repeated twenty-four hours after operation and at further intervals, if indicated. During operation a continuous intravenous infusion of normal saline solution is maintained, and towards the end of the procedure, or when the patient is returned to the ward, he receives a litre of whole blood, and this amount is repeated if necessary. Each patient is given three grains of "Prominal" two or three times per day for one to two weeks after operation to prevent epileptic seizures, and on about the fifth post-operative day massage and passive movements are commenced.

Operative Technique.

In this series of cases the surgical technique employed, and the results of removal of what has been estimated to be Brodmann's area 6 and (in more recent cases) the posterior part of area 8, are presented. A uniform technique has been employed, with the exception that in the more recent cases the area removed has been more extensive than in the earlier cases.

Each operation is carried out under local anaesthesia, and an osteoplastic flap is turned down to expose areas 4, 4S, 6 and 8.

Area 4 is then mapped out by bipolar stimulation, by means of the minimal threshold current. For this purpose a special thyratron spike-wave stimulator is used, at frequencies between 60 and 80 cycles per second and with an output of six to eight volts. Electrographic tracings have been made directly from the cerebral cortex to localize the anterior suppressor strip, area 4S. After identification of the motor points in area 4, four or six electrodes are applied directly to the cerebral cortex and connected to a Both three-channel portable electroencephalograph. Stimulation is again carried out immediately in front of the previously localized motor points, and if stimulation of a particular point abolishes the tremor and the spontaneous electrical activity in the cortex for about ninety seconds, the point is regarded as corresponding to a point in the suppressor strip, area 4S. There is frequently a cessation of tremor and electroencephalographic activity for five to ten seconds or more during stimulation; but these points have, for the present at least, been disregarded. This region is regarded as being the posterior limit of the area to be removed, and all areas containing points identified as belonging to areas 4 and 4S are carefully preserved. In fact, the whole precentral convolution containing electrically excitable points (both excitatory and inhibitory) is preserved, the tissue immediately anterior to this convolution being removed by careful subpial resection. Although it is possible that a small part of area 6 may be left behind by this method, it is adopted so as to avoid, as far as possible, any interference with the blood supply to areas 4 and 4S, thereby minimizing the chances of post-operative loss of motor power or of impairment of the suppressor effects of area 4S. It is thought that the continued activity of area 4S is an essential part of the post-operative result.

The remaining three borders of the area to be removed are mapped out by anatomical inspection. The lower limit of removal corresponds to the level of the face area in area 4, except on the side of the motor speech area, in which the resection is not extended below the level of the arm area. In the latter cases the lower part of the resection is carried out with great care, the patient speaking repeatedly during this part of the procedure, and resection is stopped immediately if there is any interference with speech. The medial boundary of resection is the mid-line, and the anterior boundary is gauged on morphological grounds, being, as far as one can judge, the junction between areas 6 and 8. It is not known what the result would be of removing the whole of area 8 in this condition, but in more recent cases, the anterior limit of resection has been extended more and more forwards into area 8 without any deleterious effects; in fact, the recent results have been more encouraging than the original results, when the area resected was smaller. The main tissue removal is carried out by block resection through the entire cortex until the white matter is exposed, and the remaining tissue is removed by careful blunt dissection and suction until the boundaries decided upon have been reached. Particular attention is paid to haemostasis, and bleeding is controlled by silk ligatures, silver clips, electrocautery and the application of hot wet packs of cotton wool. If care is exercised in this manner the whole procedure is practically bloodless. The wound is closed in the usual manner, and a rubber cigarette drain is usually left in beneath the bone flap for twelve to twenty-four hours. The blocks of cortex removed are submitted for histological study.

Case Records and Operative Results.

The procedure described above has been carried out on 15 patients, and on two of these the operation has been performed on both sides with an interval of about six months—a total of 17 operations in all. In the earlier cases the area of cortex removed was comparatively small; but as time progressed and one's courage increased, this area has become much larger and the results have been correspondingly more encouraging, with the exception that two patients have died after the procedure. Of the 15 operations that have been carried out on the 13 surviving patients, the long-term results in the first five cases were disappointing, although there was some improvement in each case for three to six months after operation. The results of the remaining ten procedures have been more satisfactory.

CASE I.—The patient was a male, aged sixty-eight years, who gave a history of the tremor-rigidity syndrome of five years' duration. He had no history of any previous illness. He walked in one day, and, placing a literary digest on the table, pointed to an article on the open page summarizing the miraculous results claimed by an overseas neurosurgeon. He then asked: "Can I have that operation?" The operation was eventually agreed upon and carried out, but unfortunately his post-operative records are incomplete, so that only a very brief summary can be presented. He presented a comparatively mild example of the tremor-rigidity syndrome, and his main disabilities were tremor, weakness and spasticity, which prevented his carrying out various movements with ease. The area of cortex removed was very small and he made an uneventful recovery.

He reported again about three months after operation, but, although he looked very well, there was no objective improvement in his original condition. Nevertheless, he said definitely that he felt better and could do more with his affected hand.

There is a strong suspicion, however, that this apparent improvement was largely psychological, as reports have trickled in that he is the cynosure of all his park cronies, who appear to regard him as little less than a deity, since he regales them with the various gory details of his craniotomy.

CASE II.—The patient was a male, aged fifty-two years, who gave a history of the tremor-rigidity syndrome, of fifteen years' duration, with no history of any previous illness. In this case the illness began with stiffness in the fingers of the right hand, followed after a short time by tremor, and at about the same time the patient complained of some pain in the proximal part of the right arm. Sub-

sequent development of the disease was slow, and about nine years later he noticed tremor in the right foot, in the lower jaw and in the lips. During the year prior to examination the symptoms had spread to the left side.

When he first reported tremor was his main disability; this was pronounced, involving all four extremities and the lower jaw and lips. It was generalized, but more pronounced on the right side, and it became much more evident during any emotional upset. Other symptoms and signs consisted of slight stiffness of movement and a rather slow gait with dragging of the right foot, occasional excessive salivation some difficulty in performing fine movements, slow hesitant speech, and a loss of about twenty to thirty pounds in weight. These symptoms were mild in comparison with other cases, and did not prevent him from carrying on with his occupation as a telephone technician, although he experienced difficulty in performing fine movements. His blood pressure was 160 millimetres of mercury (systolic) and 110 millimetres (diastolic).

Operation was carried out on the left side, as the disability was much greater in the right arm and leg. Unfortunately the patient had an epileptic seizure as the result of cortical stimulation before localization was complete, and as he took a long time to recover consciousness, the procedure was abandoned and the wound closed. One point is worthy of note: on stimulation of a narrow region just behind the central sulcus the tremor ceased completely for almost a minute. This was repeated several times with the same result, and it was regarded as being a possible point in the post-central suppressor band, area 2S. Two weeks later the wound was reopened and satisfactory localization of area 4 was obtained.

Stimulation of three points in the precentral gyrus immediately in front of the electrically excitable motor points caused complete cessation of tremor, which did not return to its full amplitude for forty-five to sixty seconds. These were considered to be possible points in the precentral suppressor band, area 4S. Cortical extirpation of a small area in front of the convolution containing the motor and suppressor points was then performed. Tremor ceased completely following the extirpation, but returned within half an hour with decreased frequency and amplitude. The patient's condition after operation was satisfactory, except for a slight motor aphasia, and there was no impairment of motor power.

During the next few days he became very lethargic, and developed complete spastic paralysis of the right arm and leg and complete motor aphasia. He caused considerable worry, but after a week his condition began to improve. He started to move his arm and leg, the increased muscle tone gradually disappeared, and speech slowly returned. Tremor remained, but it had lost its original characteristics, being slower and coarser. At the time of his discharge from hospital there was a definite improvement in his general condition as compared with his pre-operative status. Electroencephalographic examination seven days after operation revealed evidence of localized cortical damage, such as would be expected to follow a surgical procedure of this type.

Three months later his condition was satisfactory, and further clinical improvement had occurred. The tremor had diminished, he could carry out fine movements more easily with his hands, and his gait was much freer and his posture more erect. Excessive salivation had almost disappeared, and his speech had returned to normal, except for an occasional stammer. There was no reduction in the spasticity, which, if anything, had increased slightly; but the pain in his arm had disappeared. He had gained eleven pounds in weight.

Eighteen months later it was obvious that the procedure was not to be a permanent success. Most of his symptoms had reverted to about the same stage as before operation. He stated that his gait and salivation were still better than before operation, but his capacity to perform fine movements had deteriorated. In spite of all this he had still been able to carry on with his occupation as telephone technician.

Further operation with more extensive resection is being considered in this case.

CASE III.—The patient was a male, aged forty-five years, who gave a history of the tremor-rigidity syndrome of ten years' duration. There was no history of any previous illness. His symptoms had begun about ten years prior to examination, with tremor followed by weakness and stiffness in his right hand. These symptoms gradually progressed to involve the other extremities. He spoke in a monotonous voice without any play of facial expression,

and saliva dribbled out of the corners of his mouth. As he walked he was bent forwards, and he carried his arms flexed rigidly across his body. There was a continuous fine rhythmical tremor in both hands, to a less extent involving the forearms, and when he sat down the tremor could also be seen in the legs. The tremor in the hands did not cease on voluntary movement. Additional symptoms were an aching pain in the upper part of the right arm, loss of about fourteen pounds in weight during the previous two years, and great emotional instability, in that he would laugh or cry at the slightest provocation. At times he became very depressed. The only other points of interest found on examination were a generalized increase in muscle tone and in the deep reflexes, and a blood pressure of 170 millimetres of mercury (systolic) and 130 millimetres (diastolic).

Operation was carried out on the right side to avoid the motor speech area. After extirpation of a small portion of area 6 there was an immediate complete cessation of tremor, and his hand movements remained unimpaired.

During the ensuing week the left hand was free from tremor, although the tremor in the right hand appeared to have increased. There was no loss of motor power on either side. When he left hospital he had a slight tremor in the left hand, but this now stopped completely on voluntary movement. The spasticity had decreased, and movements were more powerful and more easily performed, and he could step out better when walking; the postural antero-flexion had also disappeared. Electroencephalography two days after operation revealed no abnormality.

Three months after operation the above-mentioned symptoms had continued to decrease, and in addition the salivation had diminished; he had gained about twenty pounds in weight; the pain had gone, and his emotional instability had almost disappeared. It is of interest to note that during this period there occurred also a definite reduction in the tremor of the opposite (right) hand and an improvement in its power. The capacity to perform fine movements was greater in both hands.

Eighteen months after operation his appearance was disappointing. After the first three months the improvement had stopped, and then steady regression had occurred, so that his condition was about the same as before operation. The only symptoms that had remained in a satisfactory state were his increased weight, which had not altered, the salivation and his emotional stability.

Further operation is also being considered in this case.

CASE IV.—A male patient, aged forty-six years, gave a history of the tremor-rigidity syndrome of six and a half years' duration. He gave no history of any previous illness. This man's condition was somewhat more advanced than that in the previous three cases. He had first noticed tremor in the left leg a little over six years previously. This had slowly increased and spread to the left arm, and more recently it had occurred in the right arm and lower jaw. He also complained of weakness and stiffness in his movements, which prevented him from carrying out many of the usual day's actions, such as dressing and eating. There was some increase in salivation, and he complained of pain in the region of his right shoulder. He walked with a slight stoop and dragged his left leg. Additional points noticed on examination were slurred speech, increased muscle tone and increased deep reflexes in the arm, and some fixity of facial expression. Hypertonus was present in the hamstring muscles of the left leg.

Operation was carried out on the right cerebral cortex without any unusual event. His condition remained good throughout the procedure, and there was no loss of power on the left side immediately after the small cortical resection. Two days after operation he developed a complete paralysis of the left upper extremity, but some movement was still present in the left leg. This hemiparesis gradually recovered, and when he left hospital his condition was improved as compared with his condition before operation.

During the next three months improvement continued, and when he was examined at the end of this period the spasticity was much less, and he could carry out various fine movements more easily. His walking had returned almost completely to normal, except that he had some difficulty in walking up a steep hill. His facial expression had greatly improved and was much more in keeping with his various moods, and his speech was clear and well modulated. The tremor was unchanged in distribution, although it was of slower rate and coarser. The pain had not returned since operation.

Twelve months after operation his condition had deteriorated. The tremor was worse than before operation; but it is of interest that it was now worse in the right arm, whereas prior to operation it had been worse in the left

arm. Pain was still absent, but other features, such as stiffness of movement, poor gait, inability to perform fine movements and slurring of speech, had all deteriorated beyond the pre-operative status.

Further operation with a larger excision is also being considered in this case.

Up to this time the results of surgical treatment, although encouraging in that a temporary post-operative improvement occurred, were in no way remarkable, as the symptomatic improvement had not been maintained. It was decided in the next case to carry out a slightly wider removal, in the hope that the effects would be of longer duration. The earlier patients (Case II, III and IV) have all regressed and need reoperation; but their records are included in this paper to demonstrate how the present procedure has evolved from the somewhat incongruous beginning with Case I.

CASE V.—The patient was a female, aged fifty-six years, who had suffered from the condition for four and a half years. She had no history of any previous illness.

This patient presented a more advanced example of the syndrome than the others, being almost completely incapacitated. As she entered the room she hobbled forward with short steps, aided by her husband, who had to help her into and out of the chair. Her face was devoid of any expression, and her arms were held rigidly in a semiflexed position across her body. Pronounced spasticity and weakness of all arm and leg muscles were present, particularly in the left arm, and it required a great deal of force to open the fingers of her left hand, and to extend her left elbow even a short distance. She had been unable to use her left hand for about two years, and for some months past she had almost completely lost the use of her right hand. A fine rhythmical tremor was continuously present in the left upper extremity and to a less extent in the right, and a slight tremor was also present in the left leg. Her speech was very slow and slurred, and without any modulation, and saliva was continuously dribbling out of the corners of her mouth. She stated that the condition had begun with tremor four or five years previously without any apparent cause, and she gave no history of preceding illness or accident. Pain, located mainly in the upper part of her left arm, was also a worrying symptom. The only additional features of importance found on examination were a generalized increase in muscle tone and in the deep reflexes in the arms and to a lesser degree in the legs.

Operation was carried out on the right cerebral hemisphere. As the precentral cortical area was being resected, it was fascinating to watch her left hand lose its tremor and hypertonus and slowly relax, and to see voluntary movement return, all in a matter of minutes. At the end of the operation she had a fairly good handgrip in the previously useless hand, and the tremor had completely stopped.

Twenty-four hours later the tremor had not returned, but she had lost all voluntary power in the left arm and leg, and the spasticity had returned to about its pre-operative status. She rapidly settled into the state of lethargy bordering on coma that had been noticed in previous cases, except that in this case it was much more pronounced. After ten days the left arm and leg began to relax, movements returned, and she slowly became alert. One month after operation she was discharged from hospital, and in all aspects her condition had improved as compared with her pre-operative status.

By two months after operation further improvement had occurred. The tremor had returned, but it was much slower and coarser. Present mainly when she exerted herself or when she became excited, it was practically non-existent when she was quiet or resting, and it now disappeared completely on intentional movement. The pain in her left shoulder had not recurred. Her facial expression had lost much of its "dead-pan" character, her voice was fairly well modulated, and no more excessive salivation had occurred. She could carry out most of her daily household tasks. One outstanding feature was the great improvement seen in the right hand as well as in the left, although the operation was carried out on the right cerebral hemisphere. This feature was also noted in practically all the other cases.

The foregoing satisfactory state of affairs continued for about eight months after operation, when the condition of her right arm began to deteriorate, although the left arm remained satisfactory. One year after operation her condition appeared to be worse, mainly because of progression of the syndrome on her right side. Little regression, if any, had occurred on the left side, and she could still carry out

most movements with her left hand. She had less facial expression than previously, but no excessive salivation. Arrangements were then made for her readmission to hospital for resection of the left premotor cortex, as the improvement had been steadily maintained on the left side of the body.

This was actually the tenth operation performed, as there had been other cases in between, and a still more extensive resection was carried out on the left side. By this time particular attention was being paid to the blood count and serum chemistry and to the fluid balance, as it was thought that these might have been important factors in the two deaths that had occurred a short time ago. In spite of this knowledge, the course after the second operation was much more stormy than after the first, and at times it was feared that she might die. Immediately after operation her condition was satisfactory, and there was no loss of motor power or speech and the tremor had disappeared.

Within forty-eight hours most other body functions had also disappeared, and the patient's appearance resembled that of a cataleptic state. All four extremities were extremely rigid, and she showed no response whatsoever to any external stimulus, whether a spoken word or a pinprick. She went into this state fairly rapidly, and her blood picture, which had been almost normal before operation, was rather alarming. The red cell count dropped from 5,300,000 to 3,900,000 per cubic millimetre; the haemoglobin value fell from 15.93 to 12.15 grammes per centum; the hematocrit reading fell from 38% to 28%; the blood plasma protein content fell from 8.0 to 6.8 grammes per centum; and the whole blood chloride content was increased from a pre-operative low level of 396 to 507 milligrammes per centum. Other biochemical findings were normal, but unfortunately it was not possible to estimate the circulating blood volume. Two litres of whole blood were given slowly by transfusion, and the blood picture returned approximately to normal within forty-eight hours.

After two weeks the patient's general condition began to improve, and she was soon able to walk about with slight assistance. Her neurological condition was not so good as it had been immediately prior to the second operation, but was still better than before the first operation. Her condition continued to improve after she left hospital, and in a letter written about seven months after the second operation she stated that she was much better and that she was able to do almost all the things that she had been able to do three months after the first operation. This improvement has so far been maintained twenty-seven months after the first operation.

After this procedure we were even more convinced of the importance of maintaining a normal fluid balance during and after operation. A litre of whole blood is now given immediately on completion of the procedure, whether it seems indicated or not, and so far there has been a much less frequent occurrence of the long period of profound lethargy that was such a regular feature in earlier cases.

CASE VI.—A male patient, aged forty-three years, had suffered from the tremor-rigidity syndrome for three and a half years. He gave no history of any previous illness. This patient presented the most advanced example of the syndrome that had been encountered to date. His illness had begun with stiffness of the left arm, and this was followed some months later by the appearance of tremor in the same limb. These symptoms gradually became more severe and spread to involve the left leg, and finally the right arm and leg. The tremor was present continuously. The condition advanced rather rapidly, and just before operation the patient had become practically helpless.

He had the characteristic appearance of masked facies and forward stoop, with a curious shuffling gait, so that he appeared, when walking, as if he was trying to catch up with his centre of gravity. This was literally true in this man's case, as, when he was moving, he actually had to run into some solid structure, such as a post or wall, in order to stop himself, and when he tried to stand up straight he started to move backwards. He could barely use his knife and fork, and he could just manage to scribble his name in very small writing. When he talked, saliva dribbled from the corners of his mouth, and he spoke in a slow, indistinct monotone. The only additional points were the usual increase in muscle tone and in the deep reflexes; these signs were more pronounced in the left upper extremity. Movements were painfully slow, but the actual muscle power was good on both sides. He had lost an indefinite amount of weight during the preceding year.

Operation was performed on the right cerebral hemisphere without any unusual event. After the cortical extirpation in this case the tremor did not disappear; but it became slower and waxed and waned, sometimes disappearing completely for several minutes. The hand grip remained good and the spasticity disappeared, so that, as far as one could judge, muscle tone in the left arm and leg was normal.

Three days after operation the patient had three focal epileptiform seizures involving the left side of the face and the left arm. He was given "Prominal" and had no further attacks. After this episode he completely lost voluntary movement in the left arm and leg and became rather drowsy. Movement did not return until the tenth day, after which his condition continued to improve until the date of his discharge from hospital.

Two months after operation he was able to walk quite erect, and to step out well with both legs. His general movements were still slow, but he could now carry out various fine movements, such as dressing himself, eating and looking after his personal toilet, which made him much more independent around the house; and his muscle tone had returned practically to normal. The excessive salivation had completely disappeared, and he had much more expression and modulation in his facial movements and in his speech.

On the whole one felt very pleased with the result. He was still unable to carry out any form of occupation, but he had been converted from a person who was almost a completely useless invalid to one who could, at least, perform the essentials of life without assistance, and he was able to go out alone and visit his friends. As he commented himself, there was now something worth while living for, whereas previously life was little more than a mere existence. The tremor was still present, but it was slower and coarser, and stopped completely on any intentional movement. Again a great improvement was noticed in the right arm and leg as well as in the left arm and leg.

Four months after operation his condition had varied somewhat. The left side seemed to be holding its own in most respects, but the right side had deteriorated. Tremor was still pronounced, but it stopped on the left side on intentional movement. He even boasted that he could eat peas off his knife with his left hand without spilling one, but not so with his right hand. Tremor in both legs had disappeared since operation, and although he complained of some generalized muscular weakness, he now noticed very little stiffness in his movements on both sides of his body. There was some difficulty now in performing fine movements with the right hand, such as doing up buttons, and his face was less expressive than when he had last reported. It was at this time that one became a little suspicious of the domestic situation, as his wife stated that he had been "playing up" at home "something awful", and although he appeared to be worse in some ways, when he became angry he could throw various objects at her with a surprising degree of accuracy.

The second operation was carried out, this time on the left cerebral hemisphere, about eight months after the first. By this time deterioration of the left arm had begun, with some return of spasticity, which was now about equal on the two sides. On the whole, however, his general condition was better than before the first operation, but was not so good as it had been four to six months afterwards; now the right side was worse than the left.

After the left cortical extirpation had been completed he was slightly aphasic, but motor power in the right hand was good, and the tremor and spasticity greatly diminished. His post-operative course on this occasion was not nearly so good as previously. He became lethargic, and took a much longer time to improve and to take an interest in things. He developed complete right-sided paralysis and complete motor aphasia in the first week after operation, both of which were slow to recover. Even when he was discharged from hospital, very little improvement had followed this second procedure. He seemed to have lost all his enthusiasm and desire to fight, and was content just to sit in his chair and do nothing.

Five months after operation the outlook had improved greatly, as a decided reduction had occurred in all his symptoms. This improvement continued, and twelve months after the second operation his condition was very satisfactory. Tremor was still pronounced in both hands, but it varied considerably; it was severe during periods of excitement, but when he was at rest at home or with his personal friends it might be completely absent for several hours. Frequently it ceased almost completely on intentional movement. Subjectively the spasticity had completely disappeared; on examination the muscle tone was slightly increased in the left arm, but normal in the right, and

moderately increased in both legs. His gait had greatly improved, and although he still walked with a slight stoop he could walk considerable distances without tiring. On rare occasions he developed a forward run, and he had fallen a few times. Salivation was not excessive, and he had plenty of facial expression. He could carry out almost all fine movements, and was now completely independent around the house. He could do various odd jobs such as gardening, setting a table, washing up, *et cetera*, and on one occasion he caught a flea on his leg without any trouble, and without a semblance of tremor. Great relief of his original emotional instability had also occurred, particularly during the past eight months.

CASE VII.—The patient was a male, aged forty years, who had suffered from the tremor-rigidity syndrome for twenty years. He had had encephalitis at the age of thirteen years. This patient had the condition in the most advanced form seen in this series. When he was carried into the rooms his condition was obvious, and one experienced a feeling of utter futility in attempting anything with even the faintest hope of success. He had had an attack of encephalitis at the age of thirteen years, and during the next seven years he had complained of constant drowsiness, a point which proved a stumbling block to his joining the air force. At the age of twenty years tremor developed, followed by stiffness and slowing of movements in all extremities, and these symptoms had advanced steadily up to the time of examination. By that time he was incapable of carrying out the simplest movement to help himself, and he depended entirely on the assistance of his father and mother. What slight voluntary movements he was capable of performing were painfully slow and laboured. He could even walk a few steps with assistance, but he literally took minutes to travel inches. His face was as fixed in its expression as a marble statue, with saliva continually escaping from the corners of his mouth, and speech was reduced to an unintelligible, slurred, moaning sound. It was just possible to carry on a conversation with him as long as questions were asked that required answers of yes or no, and after a while one became accustomed to the sound which indicated his meaning. In this manner the long, tedious conversation went on.

Any attempt at operation in such a case was little less than ludicrous, but he pleaded, through his parent's interpretation, that he realized the risks and small chance of improvement, but he preferred an operative death to a living one. After long consideration it was felt that sufficient release of the spasticity might be obtained to permit some freedom of movement, and so operation was eventually agreed upon.

The procedure was carried out on the right cerebral hemisphere without any unusual incident. After the area of cerebral cortex had been removed, the tremor in the left hand disappeared, there was an improvement in the movements of his hand, and the grip was stronger. During the following forty-eight hours his condition was more than satisfactory. He then had three epileptiform seizures during the next six hours. About twelve hours later his condition deteriorated suddenly, and he died in a condition clinically resembling peripheral circulatory failure. Post-mortem examination revealed an extradural hæmatoma beneath the operation flap about two centimetres thick.

Although this undoubtedly contributed to his death, experience suggests that other vascular factors were operating, as the hæmatoma did not appear to be large enough to be the sole cause of death.

CASE VIII.—The patient was a male, aged thirty-nine years. He had suffered from the condition for ten years. He gave no history of any previous illness. His condition was not so advanced as that in the previous cases, but his disability was still considerable. The illness had started with tremor in the left hand some ten years previously, and had eventually spread to the right hand; it still stopped, however, on intentional movement. His legs were comparatively unaffected, and he was able to run quite well. The disability seemed to be confined to the upper part of his body. He could still do up his buttons and feed himself, but his arm and hand movements were very awkward and slow. There was considerable slurring of his speech, which was rapid and indistinct, with much excessive salivation, and he had no expression on his face when he tried to talk.

He was admitted to hospital and a right-sided craniotomy was carried out. His condition remained good throughout operation, and after the premotor area had been excised the tremor in the left hand had stopped, and his hand grip was strong. Towards the end of operation, during closure of the wound, he became quiet and drowsy. On the following day he could not speak, although he responded slightly

to interrogation. On the second day after operation he was completely unconscious and would not respond to external stimuli. Complete paralysis of the left arm and leg was present, and occasional myoclonic twitches were noticed in the left arm. The wound was reopened in view of the possibility of a subdural hematoma, but none was found. His blood count findings had dropped slightly, but the number of erythrocytes was always above 4,000,000 per cubic millimetre, and the haemoglobin value 80 milligrammes per centum or more. Although at one stage he showed signs of recovery, he remained more or less in the same comatose condition, and on the ninth day his condition deteriorated suddenly, and he died.

Unfortunately no autopsy examination was carried out in this case; but again the terminal clinical picture resembled that of peripheral circulatory failure similar to that in Case VII.

CASE IX.—The patient was a female, aged fifty-eight years, who had suffered from the tremor-rigidity syndrome for six years. She had sustained a mild head injury one year before the onset. In this case spasticity was the outstanding feature, very little tremor being present. She had first noticed difficulty in beating eggs with her left hand, about six years previously. Apart from a slight head injury without loss of consciousness a year before the onset of the disease, she had no history of preceding illness. The spasticity had gradually spread to the right hand and then to the left arm and leg, and at the time of examination it appeared to be more pronounced in her legs than in her arms. Her movements were slow and deliberate, and she had considerable difficulty in walking. At times her face lighted up with expression, but usually she exhibited the characteristic masked faces. Tremor was only very slight, and she had no excess salivation. She complained of some pain in her abdomen and shooting pains down both legs. Her deep reflexes were all hyperactive, but although both legs were spastic, there was only a moderate increase in muscle tone in the arms.

Operation was carried out on the right cerebral hemisphere, without any unusual event. After the cortical removal, motor power was good in the left hand and leg, and no tremor was present. Particular attention was paid to this patient's fluid balance, and one litre of whole blood was given on the following day. During the next five days her general condition was satisfactory, except that she had profuse sweating all over her body. This feature had been observed in previous cases, but to a much less pronounced degree. The usual state of lethargy and loss of motor power with hypertonus was present by the third day after operation, but this gradually decreased during the next three weeks following operation, by which time she was up and walking about.

About the fifth week her condition deteriorated, and she again became drowsy and had much difficulty in swallowing. She remained in this condition for about one week, and again began to improve, and about two months after operation she was up and walking about with assistance. At the end of three months she was discharged from hospital. The spasticity was still considerable, and if anything, it was more pronounced than before operation. During the next six months a slow improvement occurred, until she reached a stage where she could walk about with difficulty. On the whole there was no improvement in her condition since operation, and in some respects the spasticity appeared to be somewhat more severe. About nine months after the operation the patient died of a coronary occlusion. No autopsy was carried out.

CASE X.—The patient was a female, aged thirty-six years, who had suffered from the condition for seventeen years. She had had encephalitis one year prior to the onset.

In this case the trouble was mainly confined to the right side. The patient had first noticed difficulty in keeping her mouth closed, as it tended to sag open. Speech became slow and monotonous. Ten years later she began to lose the capacity to perform fine movements with her right hand, such as writing and sewing, and weakness became apparent in this limb. Tremor developed about this time in the right leg, and it had occurred recently to a slight extent in the left leg, but it had not involved either arm. The leg tremor was often so severe as to make her whole body shake.

On examination, she presented the appearance of a right-sided hemiparesis. Her face was expressionless, with her jaw sagging open all the time, and a considerable amount of saliva dribbled from the right corner of her mouth. An increase in tone and in the deep reflexes was present in the right arm and leg, so that she walked rather stiffly on the

right leg, and the right arm did not swing, being held in a semiflexed position across her body. She also walked with a forward stoop. There was pronounced tremor in the right leg, but none in the right arm.

Operation was carried out on the left cerebral hemisphere without any unusual occurrence, and a more extensive resection than previously was carried out. Immediately after this motor power in the right arm and leg remained unimpaired, and no aphasia was present; but twenty-four hours after operation the usual complete right spastic hemiplegia was present, with almost complete motor aphasia. These symptoms started to diminish after about a week had passed, and had completely recovered before she was discharged from hospital. She had one right-sided focal seizure forty-eight hours after operation, without any subsequent ill effects. On her discharge from hospital she felt that some improvement had occurred, and objectively the sagging of the lower jaw and the spasticity of the limbs had diminished and the capacity for fine movements had increased.

Three months after operation the improvement was much more pronounced. One of the most remarkable features was the change in the patient's general appearance. She was much more alert, her colour was better, her eyes were bright and she really looked ten years younger. She walked with less of a forward stoop and with greater ease, more quickly and with longer strides. The spasticity had almost completely disappeared in legs and arms, and she did not notice any stiffness in her movements. She could now carry out many fine movements, such as writing, sewing and knitting, which she had not been able to do for about three years prior to operation. Her movements were still slower than normal, but they had improved in control and range. Very little tremor was present in the left leg, and there was some decrease in that in the right leg. Excessive salivation had almost disappeared, and her lower jaw sagged open only occasionally. During conversation her face was much more expressive and really lit up when she smiled, and her speech was more clear and precise.

When she was last examined, eleven months after operation, no retrogression had occurred. In fact, there had been further decrease in the tremor, which was now present only in moments of excitement or emotional stress. Still further improvement had occurred in the clarity of her speech and in her walking, the other symptoms being about stationary.

CASE XI.—The patient was a female, aged forty-six years, who had suffered from the condition for twenty-one years. She had had an attack of dengue fever about six months before the onset.

This patient was the only person in the series to complain of oculogyric crises, the illness having begun with this symptom about twenty-one years earlier. In the early stages her eyes tended to turn upwards slightly, and she was unable to bring them down to the horizontal level. The intensity of upward deviation gradually became stronger, and one year later the attacks also consisted of intermittent periods of downward deviation. At this time the attacks lasted for about an hour or so, but they gradually became more severe, so that when she first reported they were occurring several times a day for one or two days out of three.

About two years after the onset of the oculogyric crises she noticed some stiffness of her left hand, and as this increased she experienced difficulty in performing her usual daily movements. About six years after the onset this stiffness was noticed in her left leg, and walking became impaired. She found that she had to rest after she had walked for some distance, and gradually this distance became less and less until she could walk only forty or fifty yards and then had to sit down for a while. Tremor was not noticed until seventeen years after the first onset of the disease. This began in her left hand and in the lower lip. It became fairly severe, but could be partly controlled. Her speech was affected about thirteen years after the onset of the disease, becoming slower and slurred, and she had increased salivation, particularly when she talked, but this had been largely controlled by hyoscine.

When she reported for examination it was apparent that she was, to say the least, a rather unusual type of individual. Apart from her neurological symptoms, she gave a history of being irritable, easily upset and prone to attacks of weeping. She also found herself at odd times using obscene language (this was later confirmed), and she had an obsession that she was the most important person in the world. She said that when her eyes were turned downwards she felt that someone would come and steal her money that she had hidden away. These attacks of compulsive thinking

were always associated with an oculogyric crisis. Electroencephalography disclosed no abnormality to account for these symptoms on an organic basis.

She had the general appearance of a person suffering from an advanced stage of the tremor-rigidity syndrome, in which spasticity was the most outstanding feature. She looked almost like a spastic hemiplegic, until she started to speak. Her left upper and lower extremities were rigid, her left arm was held stiffly across her body, and she had great difficulty in walking, while there was no movement of the left lower quadrant of her face. The joints of her left upper extremity were almost fixed, and she was unable to perform even the faintest movement with her fingers. Apart from the coexisting increase in muscle tone and deep reflexes, the only other finding of importance was a good deal of wasting in the small muscles of her left hand, and the presence of some fibrous contractures in the interosseous and lumbrical muscles of this hand.

As spasticity appeared to be the main disability in this case, operation was agreed upon and was performed on the right cerebral hemisphere. As in Case V, it was fascinating to watch the fingers of the left hand slowly relax and voluntary movement return as the area of cerebral cortex was being excised—movements which the patient had been unable to perform for the past seventeen years. Before the main mass of tissue had been removed she was able to flatten out her palm, "fan" her fingers and exert a fairly firm hand grip with her previously useless hand.

Her post-operative course was unusual, in that she did not develop complete hemiplegia as the other patients had done, and no lethargy occurred. In fact, on the following morning she was found sitting up in bed smoking a cigarette, and was thrilled that she could hold the matchbox in her left hand while she was striking the match. She remained in this stage for about a week and then began to show further improvement. She was discharged from hospital one month after operation, and she was much better in every way.

She was last examined eight months after operation, and her condition was fairly satisfactory. Only slight tremor was present in the left hand and in the chin, much less than before operation. She could open and close her left hand rapidly, but fine coordinated finger movements were still difficult. Her gait was still spastic, but she stated that sometimes, particularly after a brief midday sleep, she could walk quite normally for several hundred yards. Speech and facial expression showed some slight improvement, she had gained about four pounds in weight, and excess salivation was negligible.

The most interesting feature in this case concerned the oculogyric crises. They completely ceased after operation, and the upward and downward turning attacks had not recurred up to eight months after operation. About four months after operation she complained of a "feeling" that they might recur, and this "feeling" has worried her considerably. As far as one can ascertain this "feeling" occurs periodically and appears to be a sort of indescribable aura. During the past two months the oculogyric crises have recurred, but much less frequently. The interesting point is that now they consist of deviation of the eyes to the right, with an occasional slight upward or downward component.

CASE XII.—The patient was a female, aged thirty-two years, who had suffered from the condition for five years. She had had a severe attack of influenza two years before the onset. This patient also presented a unilateral example of the tremor-rigidity syndrome, which had begun with tremor of the right hand and leg about five years previously. She had had a rather severe attack of influenza about two years prior to the onset of tremor. The tremor had gradually progressed, and eventually she was able to carry out her duties only with difficulty. At the time of examination she had given up writing, and she was able to carry out coarse movements, such as ironing, only with difficulty. Sometimes she spilled her food, particularly fluids. Her general movements had slowed considerably, and the right arm and leg had become stiff over the past twelve months. Slight excessive salivation was present.

On examination of the patient, a pronounced rhythmical tremor of the right arm and leg was present, with little or none on the left side. There was a tendency towards a masked facies. The hand grip was good on both sides, and some increase in muscle tone was observed in the right arm and leg, with an increase in deep reflexes on this side. Slight unsteadiness was present on walking, with a tendency towards a flexed posture. Mild slurring and monotony were noticed in her speech.

Operation was carried out on the left side, and although she had a seizure during stimulation, I was able to complete the procedure, when she recovered, without any further unusual event. Her speech and arm and leg movements remained unaltered throughout the procedure. Twenty-four hours after operation she developed complete motor aphasia and complete spastic paralysis of the right arm and leg; but although she was somewhat drowsy at times, she did not become definitely lethargic as did most of the earlier patients.

When she was last examined about four months after operation an improvement had occurred. The tremor was still present, and it appeared to be more pronounced than before operation; but it now stopped on intentional movement. The spasticity had almost completely disappeared and she was walking well. Her movements were freer, and her capacity to perform fine movements was almost normal, although she was still slow in carrying them out. Her speech had improved slightly, and although it was still slow, it was more precise and her face was more expressive than previously.

CASE XIII.—The patient was a female, aged fifty-one years, who had suffered from the condition for twenty years. She had no history of any previous illness. This patient presented a very advanced example of the syndrome, and she was completely bed-ridden. The disease had begun twenty years previously with tremor in the right foot. It gradually spread to involve the other extremities, but never became severe enough to constitute an actual disability. Rigidity was her main worry; it had begun about fourteen years after the tremor in the right leg. This gradually spread, and on examination she was found to have generalized spasticity with increased deep reflexes, more pronounced on the right side. This accounted for her inability to walk or to carry out any fine movements. Other symptoms were present only to a minor degree, except for personality changes. By the time she came to operation she was depressed, emotionally unstable and crying practically the whole time. She no longer seemed to have any desire to get better, and for this reason the operation was nearly cancelled.

However, operation was carried out on the right hemisphere and she cooperated well during the procedure. In this case area 6 was not removed, but was isolated from area 4 by a vertical incision down to the white matter, from the mid-line to the face area. Area 6 was then undercut at a subcortical level throughout its whole extent. This procedure was adopted because, when the incision was made between areas 4 and 6, the preexisting spasticity completely disappeared, and her muscle tone appeared to be normal. At the same time the hand movements became freer and the hand grip was much stronger than it had been previously. During the next week she developed the usual hemiplegia and was moderately lethargic, and then she improved most satisfactorily for the following two weeks. Her left hand movements showed an improvement and her mental outlook was much brighter. Unfortunately a small boil developed in her scalp behind the wound during the third week after operation, and this spread so that the posterior part of the wound became infected, which fact greatly prolonged her stay in hospital. This was accompanied by pronounced deterioration in her mental outlook, and she became depressed and did not try to carry out her exercises. It was eventually decided to permit her to return home before the wound was completely healed, to try to improve her mental outlook.

She was readmitted to hospital five months after operation, and as the infection had not cleared up, the bone flap was removed. There was a striking improvement in her condition. She was still a complete invalid, but was somewhat more independent than previously. The spasticity in her left arm and leg was much less pronounced and she had more freedom of movement. She can now walk quite a distance with assistance and can carry out various fine movements with her left hand. Her mental outlook has greatly improved and her face is literally full of expression.

This improvement is really comparatively small; but still it is encouraging, when one considers the bad condition of this patient before operation.

CASE XIV.—The patient was a male, aged thirty-five years, who had suffered from the tremor-rigidity syndrome for eighteen years. Five years prior to the onset he had sustained a head injury with unconsciousness.

This patient's main symptom was a violent tremor of the right upper extremity, which literally shook his whole body. This had begun eighteen years previously without any apparent cause, and had gradually progressed. It was

confined to the right side, and at the time of examination the main movement was at the elbow joint, and to a less extent at the shoulder joint. It was extremely violent; the hand moved through an arc of about twelve to eighteen inches. In the early stages it had been the characteristic pill-rolling type of tremor, but it had gradually increased until now it was the most violent example that has been seen in this series. A coarse tremor of the right leg and some tremor of the lower jaw were also present. Moderate spasticity of the right arm and leg was present, with increased deep reflexes. He walked with a pronounced forward stoop and with the aid of a crutch and stick. Only slight masking of his facies was present, and his speech was somewhat slurred. Fine movements were impossible because of the violent tremor.

Operation was carried out on the left hemisphere, and in this case it was limited to section only, as in Case XIII. The section was made between areas 4 and 6 down to the white matter, from the mid-line to the face area. Area 6 was then undercut, to sever all fibres between the cortex and the deeper structures. It is interesting to note that during the next ten days a right spastic hemiplegia developed, with complete motor aphasia, and the patient subsided into the deep state of lethargy that was seen in the earlier cases, even though area 6 had not been completely resected. Pronounced generalized sweating occurred during this period. Recovery was eventually complete, but when he was discharged from hospital no obvious improvement had occurred as compared with his pre-operative condition. He was last examined two months after operation, and by this time an improvement had occurred. He could walk without his crutch and stick, with less of a forward stoop and more freely. The tremor of his right arm was less violent.

This improvement was only comparatively slight and considerable disability was still present; but the improvement was definite. It will be interesting to see what changes occur during the next six to twelve months.

CASE XV.—The patient was a female, aged fifty-six years, who had suffered from the condition for twenty-five years. She had had a severe attack of influenza six months prior to the onset. This patient's most disabling symptom was rigidity which had begun in the right leg twenty-five years earlier and had gradually spread to involve all the other extremities. At examination pronounced generalized spasticity was present, with increased deep reflexes, and she could barely walk with assistance and could not perform any fine movements with her hands. Tremor had begun in the left hand eighteen months after the onset and had gradually spread to involve both upper extremities. Speech was slurred, she showed no facial expression of emotion during conversation, and a fairly pronounced increase in salivation had occurred. She had lost about sixty pounds in weight during the past seven years.

At operation area 6 was resected on the right side without any unusual event. After operation the usual hemiplegia developed, but she did not become very lethargic. In this case the paralysis lasted for almost a month, much longer than usual, before it showed signs of recovery. Her whole post-operative course was much slower than usual. She was still in hospital, two months after operation, undergoing massage and exercise. Her left hand was much less spastic than the right and movements were freer. She had begun to walk with difficulty, and only with assistance. Her speech had improved, there was no dribbling of saliva, and she showed a good deal of facial expression when she talked.

At the moment it looks as if the chances of a good result are not very promising, but final assessment can be made only in a further year or so.

Symptoms and Signs after Operation.

1. Tremor.

The effect of this operation on the tremor has been quite inconsistent in this series of cases. It has not been completely abolished in any case; but in a few cases it has been greatly reduced so that it occurs only in times of excitement or some other emotional upset. In the majority of cases it has been somewhat modified, in that it has become slower and coarser and has tended to cease on intentional movement, so that the patients have been able to carry out various fine movements accurately. When the intentional movement is finished the tremor recurs, but this has been an improvement over the pre-operative status. It will be noted that in most cases the tremor has stopped completely immediately

after the cortical resection for periods varying from hours to days, but it has recurred later in its modified form. The obvious question is, why should the tremor recur once it has completely disappeared? Is this due to some fault in the operative technique? If this is so, it may be possible to relieve the tremor completely by this procedure when we attain a more accurate knowledge of the function of the cortex and its deeper connexions.

2. Rigidity.

The greatest benefit obtained from this operation has been in relation to the spasticity and its subsidiary symptoms. In most cases a definite, though variable, diminution in muscle tone has occurred, with a corresponding reduction in the deep reflexes. The capacity to perform fine movements has been enhanced, and the patients feel stronger in their actions. It is still believed that the alleged weakness is more apparent than real, and that the improvement is really due to the fact that the patients can perform movements more easily and rapidly. The actual power does not seem to be materially altered. Unfortunately, dynamometric recordings have not been made, but this will be done in future.

The cranial nerve symptoms related to mastication, facial expression, speech, swallowing and flexed position of the head and neck, have all shown varying degrees of improvement. The dribbling of saliva has disappeared in practically every case. It is thought that this is probably due to diminution in tone of the facial, lingual and pharyngeal muscles, which has permitted easier and more frequent use of these muscles and consequently greater freedom in collecting and swallowing the saliva that continually forms in the mouth. The forward stoop has largely disappeared, and in a few cases the patient has been able to walk completely erect and to step out more freely. Pain, when present, has disappeared in all cases, corresponding with the decrease in spasticity.

3. Oculogyric Crises.

Oculogyric crises have occurred in only one case, so that no reliable conclusions can be drawn. In this case the upward and downward deviation of the eyes has not recurred since operation, although the patient has had what she terms a "warning" of their recurrence on several occasions. However, about six months after operation she complained of crises involving deviation of both eyes to the right, occurring much less frequently than previously and lasting up to one hour. It may be possible that these attacks are due to overaction of the fronto-adversive field on the left side following operative damage to that area on the right side. The intermittent nature of the attacks would seem to be somewhat against such a basis, and would rather suggest a neuronal discharge as the underlying cause. Such ideas, however, are purely speculative and are formed on no sound basis. "Dilantin" has not relieved these attacks.

4. Mental Status.

In all relevant cases the emotional instability has been greatly relieved, even as far as a return to normal. This cannot be attributed directly to operation, but is probably due to the patients' joy at whatever improvement has already occurred, together with hope for further improvement in the future.

5. Weight.

Most patients have regained their lost weight after operation. This is probably due to increased exercise and a more normal diet.

6. Autonomic System.

Although the autonomic system is not particularly affected in the ordinary course of the syndrome, rather alarming disturbances have occurred during the post-operative period in several cases. Some subjects have sunk into the curious state of lethargy described above. There is a subtle difference between this and the coma that is associated with such conditions as head trauma or intracranial tumour. The patient lies completely inert

and shows little evidence of life, except shallow respiration, a feeble, regular pulse and normal blood pressure; and yet a degree of consciousness is present that makes one feel he is quite aware of his surroundings. He can swallow liquids slowly when asked to, and one can feel the barest movement when he is asked to squeeze one's hand. Whether this phenomenon is related to some interference with hypothalamic function or to frontal lobe disturbance is problematical, but none the less fascinating. In one patient this state of lethargy was particularly deep, although the connexions between area 6 and the frontal lobes were not severed.

In some cases profuse sweating has occurred during the post-operative period. There has frequently been some disturbance of the fluid balance, and this has been minimized by the administration of transfusions of whole blood together with normal saline solution, glucose solution, glucose-saline solution or serum, according to the blood chemistry readings. In one case there was a dramatic reduction in the level of several blood constituents with an elevation of that of the blood chlorides, which did not appear to have a logical explanation, and which was rapidly relieved by transfusions of whole blood. In the two fatal cases the manner of death resembled that of peripheral circulatory failure, and intravenous infusions of blood and other fluid had but little effect. It is thought, however, that intravenous therapy may have been commenced too late to be of value.

The complete hemiplegia and aphasia that have occurred in most cases for about seven to ten days after operation present another curious feature that could possibly have an autonomic background. In the earlier stages it was thought that these phenomena were due to post-operative cerebral oedema, and yet there are certain points that make one feel that this is not the true explanation. The operation has been carried out with extreme delicacy and with a minimal amount of trauma to the surrounding tissue. If this technique is compared with that employed in other conditions such as cerebral trauma and tumours, in which operative trauma is much greater, one would expect more frequent and more profound paralysis in the latter cases if oedema was the cause. And yet the converse is the case. Temporary post-operative hemiplegia is uncommon after removal of tumours or of damaged tissue in this area, whereas it has been almost a rule in removal of area 6 in cases of the tremor-rigidity syndrome. There is undoubtedly much more behind this pronounced loss of function following operation than is apparent, and at the present time no logical explanation can be offered as the result of this work. One notable point about these side effects is their complete inconsistency and failure to follow any set rule. All or none may be observed in any one individual.

Conclusion.

This paper presents the results of resection of area 6, with careful preservation of areas 4 and 4S, in 15 cases of the tremor-rigidity syndrome. At the present time this must be regarded entirely as a preliminary report, and the whole work as still being in the experimental stages. No guarantee of improvement can be offered to any individual patient, although in most of those patients operated upon to date there has been a gratifying and encouraging reduction in many of their symptoms. There can be no suggestion that this operation aims at a surgical "cure"; this is impossible, as the initial damage to various parts of the brain has already occurred and is probably irreparable. The sole object has been to remove some, at least, of the cortical automatic control and so relieve the symptoms by bringing muscle tone and movement more under voluntary control. The results obtained to date show that this object has been partially achieved, and open up the possibility of further success, even to complete relief, when we understand more fully the mysteries of the extrapyramidal system. The best that can be claimed so far is sufficient improvement to transpose the patient from a completely dependent invalid into one who is independent, and can get about and look after his own personal wants without having to rely on someone else. Even this degree of improvement represents

paradise to these people when compared with their previous condition of dependence on others.

The operation must be regarded as very serious, and one that should not be undertaken lightly. The whole procedure should be explained to the patient in detail, together with its accompanying risks and chances of relief. However, in view of the improvement obtained, slight though it may be, in the majority of patients that have undergone the operation, one feels justified in continuing this work. So far practically all patients have been accepted for operation, only the very aged being refused. Experience has taught, however, that the chances of good results are less in patients over the age of about fifty-five years, and in patients in whom the syndrome is advanced or of long standing. The response of tremor to the operation is problematical and inconsistent. In some cases relief has been almost complete; in the majority it has been modified as described above; while in some again there has been no relief. In view of the fact that in some cases the tremor has been completely abolished immediately after operation for a varying period of time, one must continue to search for the reason for its recurrence and keep in mind the possibility of complete and permanent relief when that reason is fully understood.

Another point that presents itself is whether this operation, when perfected, will not only produce a reduction of the patient's existing symptoms, but also arrest the progress of the condition and help to maintain that improvement throughout the remainder of the patient's life. This improvement has been maintained in one patient for twenty-seven months, but of course the final assessment cannot be made for many years yet to come. Finally, several interesting and as yet inexplicable points have arisen as the result of this work, and these may open up fresh avenues for future study. If, besides helping these unfortunate sufferers even in a relatively small way, these same points lead to further research and eventually to the acquisition of greater knowledge of the physiology of this important part of the central nervous system, then I shall feel more than gratified at having carried out this work.

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THE EFFECT OF SURGERY UPON THE CANINE TREMOR-RIGIDITY SYNDROME.

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THERE exists a naturally occurring encephalitis of dogs which may manifest itself as a syndrome resembling Parkinsonism in humans, and which is designated the tremor-rigidity syndrome in this study.

While the canine tremor-rigidity syndrome often follows distemper, it is not known as yet whether the encephalitis producing it is also a manifestation of distemper or of some other virus infection. The pathological lesions in the acute phase are those of a demyelinating encephalitis affecting various portions of the brain, especially the cerebral cortex, the basal ganglia, the brain stem and the cerebellum. Glial cells participating in the acute inflammatory reactions may contain nuclear inclusions.

This paper presents examples of the canine tremor-rigidity syndrome which were treated neurosurgically, and the results of subsequent anatomical studies upon their brains are incorporated in the case histories. The details of the pathology of the acute encephalitis, however, form the basis of another paper.

Selection of Cases.

In view of the similarity between the tremor-rigidity syndrome in dogs and in humans, it was decided to carry out neurosurgical procedures upon such dogs identical with those currently being performed upon human subjects of the tremor-rigidity syndrome. The object of this was to study the effects of excision of the premotor cortex upon these animals, in the hope that it might shed some light upon the mechanism of the results obtained in human cases.

Subjects with non-progressive lesions should be chosen, as the earlier experiments showed that dogs in which the symptomatology of the tremor-rigidity syndrome was clinically progressive were unsuitable surgical subjects. In order to determine whether or not the symptomatology was progressive, a careful history of the disease was taken, and the dogs were kept in the veterinary hospital for some time in order that personal observations could be carried out. After each dog was selected, its nutrition and water balance were kept regulated for some period prior to operation in order to provide the optimum conditions for the procedure. This was found to be most important, as many of these animals were in a poor state of nutrition.

When subjects for operation had been selected, numerous clinical examinations were carried out at intervals to

determine the exact distribution of tremor, weakness and spasticity, and cinematograph records were made both before and after operation.

Surgical Procedure.

Craniotomy was performed under "Dial" anaesthesia. In all dogs except one (which died at the end of the procedure) unilateral operations were performed. The excitable motor cortex was found by bipolar stimulation of the lateral surface of the exposed cerebral hemisphere, the thyratron stimulator being used. In the dog, motor responses may be obtained with this instrument with frequencies between 60 and 80 cycles per second and a voltage of about seven volts. In all dogs examined in this and other experiments, the electrically excitable region of cortex was found to be along an oblique line which, subtending an angle of about 60° to the superior sagittal sinus, crosses the anterior tip of the ectosylvian gyrus. Points were thus identified, stimulation of which produced movements of the *orbicularis oris*, *orbicularis oculi*, and other muscles of the head, trunk and limbs on the opposite side of the body. In some cases homolateral movements were also produced by such stimulation, and the tremor, no matter where situated, appeared to be potentiated on both sides of the body by unilateral stimulation of the region described.

In the earlier cases, six electrodes were then placed symmetrically over the exposed surface of the hemisphere, and cortico-electrograms were recorded on the portable electroencephalograph. This was carried out in order to identify the premotor suppressor band (area 4S), stimulation of which inhibited the tremor of this disease as well as the spontaneous electrical activity of the brain. In the dog, area 4S has been found constantly to lie parallel to, and about three to five millimetres in front of, the oblique excitable motor region, and in the operations carried out, electroencephalographic identification of its site was not performed as a routine measure, as it could be readily identified by the suppressor effect on the tremor (which persisted with this type of anaesthesia).

Areas 4 and 4S having been identified, the region of cortex immediately anterior to the latter (that is, area 6 and portion of area 8) was then removed by subpial resection, the grey matter being excised down to the white matter from a region just anterior to those points of the excitable motor cortex which represented the regions of the opposite side of the body in which the tremor and/or spasticity was present. Care was taken to ensure that the suppressor points in area 4S were left intact. The posterior portion of area 8 was also included in the excision.

Reports of Cases.

CASE I (P.G. NUMBER 189).—The subject was a black and tan terrier, aged two years, which was admitted to the department on October 15, 1947. Ten weeks previously the animal had developed an oculo-nasal discharge. This lasted about ten days, then cleared up. One week prior to its admission to hospital the animal became irritable and savage and developed a tremor in the right hind leg. It became weak, refused to eat and was unable to stand.

On examination of the dog, the cranial nerves were normal. There was pronounced tremor in the right hind leg, in which the flexor muscles were hypertonic. There was some hyper-tonus also in the left hind leg, and occasional tremor was noticed. Muscular wasting in the flexor muscles of the right hind leg and in the flanks on the right side was observed, and there were two small ulcers on the hock. Tremor was also present in the left foreleg, but in this case it consisted only of fascicular twitches in the flexor muscles. The animal stood with its right hind leg raised in a flexed posture, and it could be straightened only with difficulty. The placing and landing reactions were normal in the forelegs, but grossly impaired in the hind legs.

Craniotomy was performed on the left cerebral hemisphere on October 27, 1947. Four days after operation the animal was active and eating well; it was able to walk satisfactorily, placing all four legs on the ground. The hypertonus had disappeared in both hind legs, but tremor was still present in the left hind leg. Two weeks after operation the tremor had become much worse, and was pronounced in all four limbs. Spasticity had not returned and the dog was able to use all four limbs to ascend steps.

Three weeks after operation the tremor was still more diffuse and violent than pre-operatively; but the animal's capacity to perform fine movements and the muscle tone in all limbs were normal. By the end of the fourth week the tremor had diminished somewhat, and it continued to do so over the next two weeks, so that by two months after operation tremor had disappeared in the left hind leg and foreleg, but was still present to a reduced extent in the right hind leg. The animal's condition remained at this level, and, except for the tremor mentioned, which now disappeared on voluntary movement, it appeared to be a normal dog.

On January 5, 1948, the animal was killed for the purposes of an anatomical study of the brain. At this date, the tremor of the right hind leg had become more pronounced, although there had been no return of hypertonus anywhere in the body.

Microscopic examination shows that the dural scar at the operation site is cellular and is undergoing reparative changes. Subjacent to this a good deal of the ectosylvian gyrus has been removed, but the depth of removal was not sufficient, many pyramidal cells of area 6 being still present. In the operative area, neuronal degeneration, neuronophagia, glial cell proliferation, some perivascular cuffing, and phagocytic cells can all be observed. Elsewhere, in foci, the small pyramidal cells are degenerate and are undergoing neuronophagia, but the Betz cells of area 4 are unaffected.

On the right side, degeneration of the smaller pyramidal cells, neuronophagia and thickening of some of the smaller vessels are prominent features. The Betz cells of area 4 appear to be unaffected.

The changes in the basal ganglia are not pronounced. In the left caudate nucleus are found some small foci of neuronal degeneration, some slight perivascular cuffing by mononuclear inflammatory cells, and thickening of some small vessels.

In the mid-brain there are some thickened vessels, in the walls of which remnants of inflammatory cells remain. Subependymal gliosis is also present. No gross neuronal degeneration can be detected.

Medullary changes consist in increased cellularity of the floor of the fourth ventricle, in which slight neuronal degeneration may be observed in most nuclei, but more especially in the right vestibular nucleus, which shows some "eosinophilic" degeneration of neurones.

In the subpial aspects of the cerebellar peduncles, slight focal glial cell proliferation is present. In the cerebellum there is some slight increase of glial cells in the roof of the fourth ventricle. Elsewhere slight increase in glial cells may be seen in subpial portions of the *arbor vitae*, but not in the molecular layer.

No significant cord lesions are detectable.

In the meninges, apart from the operation site, thickening and focal cellular infiltration by mononuclear cells are present.

Studies of the tracts show degeneration affecting fibres from the operation site, in the posterior limb of the internal capsule and in the left pyramidal tract as far as the medulla, but not apparent further down.

CASE II (P.G. NUMBER 190).—The subject was a black and white kelpie cross, aged ten months, which had been admitted to the department on September 2, 1947. Some months earlier this animal had had distemper, which cleared up after about a week. Six months prior to its admission the animal developed twitching in the muscles of the shoulder girdle and in the left temporal muscle, and had remained in that state ever since.

On examination of the dog, there was no clinical evidence of acute distemper infection. The cranial nerves were normal, except for regular clonic twitching of both temporal muscles. There was also tremor in the left biceps region and in the gluteal and flexor muscles of the left leg. Muscle tone was increased in both legs on the left side, more so in the hind limb, in which the extensor thrust reflex was also absent. The approach and landing reflexes were also absent in the left hind leg. The other reflexes were normal. There was excessive secretion of saliva.

Craniotomy was performed on the right side on September 15, 1947. Four days later the animal had recovered from operation and was alert and active. The muscle tone in the left fore and hind legs was not equal to that on the right, but tremor was still present in the left hind leg.

Two weeks after operation the animal's movements were normal and it was able to ascend and descend steps without difficulty. However, the tremor had increased in amplitude in the left hind leg, and had also spread to the two legs of the opposite side. It continued to increase over the next week, so that by the end of three weeks there was pronounced

clonic twitching in all four limbs and in the jaws. During the next week the tremor commenced to diminish in amplitude in all regions, and this continued, so that by the end of five weeks after operation, it had completely disappeared from all regions of the body. Muscle tone was normal in all muscle groups, and the approach and landing reflexes were now normal in all four limbs. It was impossible to detect any abnormality in this animal, as evidenced by numerous observers, and its status remained the same afterwards. The animal was destroyed in the first week in January, 1948, for purposes of histological study.

Microscopic examination of the brain of this animal shows that at the site of operation the meninges are in process of cellular proliferation and repair. Subjacent to this the greater part of the ectosylvian gyrus has been removed, and in what remains an occasional degenerating neuron can be recognized amidst the cellular reaction. Elsewhere, in foci, the small pyramidal cells show neuronophagia, pyknosis of their nuclei and various other forms of degeneration. The Betz cells of area 4 are relatively undamaged. Perivascular cuffing and thickening of the small vessels are focally distributed in the grey matter. On the opposite side, similar cortical lesions are present, though of less degree.

In the basal ganglia on the side of operation the caudate and lenticular nuclei show occasional perivascular cuffing, and in other vessels residual thickening of the walls is seen.

The main mid-brain lesion is an area of demyelination situated in the mid-line, between the medial borders of the *substantia nigra*. There is some residual perivascular inflammation and some of the other vessels are thickened in this area. Dorsolaterally on each side, subpial glial cell proliferation and slight demyelination are present.

Increased cellularity is present in the floor of the fourth ventricle, and in the lateral recesses pronounced glial cell proliferation is observed. There are several small perivascular foci of demyelination in the mid-line between the olives.

The cerebellar peduncles show slight subpial glial cell proliferation, but no demyelination. Similar changes affect the subependymal white matter of the flocculo-nodular lobules. Throughout the remainder of the cerebellum, small foci of cellular proliferation are associated with slight vascular cuffings. These are of minor degree, causing very small areas of demyelination.

Examination of the spinal cord shows no obvious abnormality.

Myelin studies of the tracts demonstrate some degeneration of the pyramidal tract, which can be traced from the site of operation to the medulla, but no further.

The meninges are thickened throughout and contain focal inflammatory aggregations.

CASE III (P.G. NUMBER 191).—The subject was a red kelpie, aged two years, which had been admitted to the department on September 1, 1947. Six months prior to presentation the animal had developed distemper. A few weeks later it appeared to have recovered, but a vertical tremor was present in the head and neck. Three months later the tremor was more pronounced and was constantly present. There also appeared to be some stiffness in the front legs, and the animal had difficulty in ascending steps and in lowering its head to drink. Prehension of food was also impaired. The dog had also become irritable and savage.

On examination of the dog the findings were as stated. The hind limbs were normal, but hypertonus and exaggeration of tendon reflexes were present in the fore limbs. The placing and landing reactions were grossly impaired in the fore limbs, but normal in the hind limbs. No other neurological signs were present.

On September 17, 1947, the animal was operated upon, the right premotor cortex being resected according to the technique described.

One week after operation the animal had recovered and was eating well. The tone in the fore limbs on both sides was normal, but the placing and landing reactions were impaired. Tremor was still present in the head and neck, but ceased when voluntary movements of prehension were undertaken. Prehension was still unsteady and ataxic, however. By ten days after operation, the tremor was much more severe, having increased in amplitude and spread to involve all the forequarter muscles; it still ceased on voluntary movement, however. Otherwise the animal was as before.

During the next three weeks the tremor gradually became less pronounced and less constant. By five weeks after operation the tremor had almost disappeared, the placing and landing reactions were normal, and the dog could run up and down stairs normally. Prehension was now precise,

and all head and neck ataxia had disappeared. Two months after operation the animal showed no abnormality, except that it was still savage and bad-tempered. It had put on weight, and on examination numerous observers could detect no abnormality in posture or movement. The animal's condition remained static until it was killed on January 5, 1948, and an autopsy was performed.

Microscopic examination of the portion of area 6 of the cerebral cortex removed by operation on September 17, 1947, shows mononuclear cell infiltration of the meninges and thickening of the meningeal vessels. The small pyramidal cells characteristic of area 6 are very degenerate with vacuolation of the cytoplasm; pyknosis of nuclei and neuronophagia is present. There is a generalized increase in microglia throughout. Thickening of the small arterioles is present, and in places perivascular cuffing by lymphocytes and plasma cells is also observed. Occasional small inflammatory nodules are present throughout the tissue.

Examination of the brain obtained at autopsy shows an adhesion of thickened dura to the cortex at the site of operation.

Microscopic examination shows that the dura at the site of operation is densely fibrous with new bone formation. Deep to this, most of the ectosylvian gyrus has been removed and the corresponding white matter contains polymorphic microglia and proliferating glial cells.

In what remains of area 6 on the right side, the pyramidal cells are degenerate. Elsewhere, focally, the smaller pyramidal cells show varying grades of degeneration, while the Betz cells of area 4 are relatively unaffected. In the areas of degeneration, thickened small arterioles are frequently observed.

There are changes in the left cerebral hemisphere similar to those in the right.

In the basal ganglia no striking abnormality is present, though slight neuronal degeneration is observed in the right *globus pallidus*.

In the mid-brain, vascular thickening can be observed, as elsewhere, but no gross neuronal damage is demonstrable. Some subpial demyelination and glial cell proliferation are present on the postero-lateral aspects.

There is a slight increase in glial cells in the floor of the fourth ventricle, particularly in the lateral recess. This also involves the roof of each lateral recess. The roof nuclei, though related to residual inflammatory reactions, appear undamaged.

There is degeneration of the right pyramidal tract, which may be traced from the site of operation to the medulla.

Discussion.

Four animals in the acute phase of the disease all died within twenty-four to forty-eight hours of operation, with one exception; this dog initially appeared to be in the chronic phase of the disease, but subsequent clinical and pathological study revealed the condition to be acute. This animal recovered from the operation and survived for about two weeks; but although the tremor and rigidity on the side corresponding to operation diminished, the disease progressed rapidly in other regions of the body, and the general condition of the animal deteriorated. This dog was destroyed for purposes of pathological study. Two dogs in the chronic phase, upon one of which bilateral excision was attempted, died too soon after operation to enable any conclusions to be drawn therefrom.

The three dogs in the non-acute phase, which have been available for long term study, immediately on recovery of consciousness showed a marked increase in the amplitude and rate of the tremor of the whole body, although the spasticity disappeared in the limbs corresponding to the operation site, and in the jaws. The only paresis following operation was a slight transient flaccid paralysis of the carpal joints, which disappeared in about seven days and was probably associated with cerebral oedema in the neighbourhood of the region of cortical ablation.

By about the fifth post-operative day the dogs were up and running about, eating well and behaving normally. At this stage the tremor began to diminish in rate and amplitude, and over the next ten to fourteen days it continued to do so until it disappeared or was manifest only at very infrequent intervals. The pre-operative spasticity did not return, at least not for the periods over which these animals were observed—namely, ten weeks in Case I and sixteen weeks each in Cases II and III. After such an operation there were none of the clinical

signs usually said to be associated with lesions in areas 6 and 8, and the reflex responses of the various muscle groups were all normal. There were no autonomic disturbances and no interference with the functions of bladder or bowel. In the selected chronic cases, no progression of tremor or spasticity to other regions of the body was noticed after operation, and the dogs approximated closely to the normal. Ataxia disappeared, and the animals could jump obstacles and run up and down steps without difficulty. Sialorrhoea also disappeared after operation, and the animals put on weight.

It is not possible to correlate pathological changes with symptoms and signs owing to the complicating factors of residual encephalitic lesions and the results of operative interference. However, the factor common to the animals described in this study and to thirty animals which had not undergone operation (not included in this study) is degeneration of the smaller pyramidal cells of the cerebral cortex in the motor and premotor areas.

Summary.

1. Three cases have been presented of a canine tremor-rigidity syndrome resembling Parkinsonism in humans. In Case I the disease had remained stationary for three weeks and in the remaining two cases for six months and three months respectively, prior to operation.

2. The result of excision of area 6 and part of area 8 of the premotor cerebral cortex was to abolish both tremor and rigidity in two cases and relieve it in a third, so that only a minor degree of tremor persisted.

3. The results of subsequent anatomical study of the brains of these animals have been presented.

Acknowledgements.

Thanks are due to the members of the staff of the Department of Veterinary Science, who put their facilities at our disposal; to Mr. Brian Turner and Mr. T. Jamieson, who assisted in the operative procedures; and to Mr. Bruce Monro, who made all the numerous histological preparations.

THE FINDINGS OF A CHEST X-RAY CENTRE.

By J. N. BURGESS, M.B., B.S., D.D.R.,
Radiologist, Sacred Heart Hospital, Moreland,
Victoria.

MASS X-ray surveys of the chests of the civil population are a potent weapon in modern preventive medicine and a record is made here of a suburban centre in Melbourne. Ten thousand microfilms have been taken at the Sacred Heart Hospital in Moreland.

The mass radiography clinic at the above hospital under the auspices of the Brunswick and Coburg Councils was officially opened in October, 1945. The Councils purchased and installed a camera unit to be used in conjunction with the hospital X-ray equipment by their radiographer.

A part-time canvasser was appointed to interview business firms and to visit schools, and more recently women of the local Red Cross branch have been helping with the clerical work and also making house to house visitations. It was not until March, 1946, that people began to come in steady numbers.

The clinic is held on Tuesday and Friday afternoons and evenings, the former day being for females and the latter for males. Large groups from factories or schools are frequently examined on other afternoons and clubs or lodges on other evenings.

All films are read by the hospital radiologist, and reports of negative findings are sent by the Red Cross ladies to the examinees. The majority of those with abnormal lung findings are requested to return for a large chest film. Reports of these are sent to the patients' doctors if there is any suspicion of activity, and the patients are written to requesting them to visit their doctors as soon as possible. If obvious healed lesions are

found the patients are advised to have further films made in three or six months.

Those subjects with definitely enlarged hearts are referred to their doctors for further examination and investigation. All normal individuals are recommended to be reexamined, those under the age of thirty years in six months and others in twelve months. However, this advice has been heeded in only a very few instances. Emphasis is made that a "negative" report means that no tuberculosis has been radiologically demonstrated at the time of the X-ray examination.

The findings can be summarized as follows.

1. Probable Active Tuberculosis (recorded from 17/14 films)—	
(a) Infiltration with cavity	11
(b) Active infiltration	8
(c) Chronic fibroid tuberculosis	13
Total	32
2. Calcifications (some due probably to healed tuberculous infection)—	
(a) Calcified hilar glands	20
(b) Calcified hilar glands and nodules in lung ..	12
(c) Apical calcification	15
(d) Calcified nodules in lung fields	5
(e) Local calcified areas	16
(f) Calcifications in two lobes	5
Total	73
3. Other Pulmonary Lesions—	
(a) Bronchitis	25
(b) Bronchiectasis	24
(c) Bronchopneumonia	4
(d) Pleural fluid	7
(e) Dense pleural adhesions	21
(f) Secondary carcinoma	11
(g) Silicosis	2
(h) Boeck's sarcoid	1
(i) Hydatid disease	1
(j) Lung abscess	1
(k) Abnormal diaphragm	3
4. Cardiac or Vascular Lesion—	
(a) Enlarged hearts	104
(b) Aneurysm	1
(c) Dextrocardia	1
5. Abnormality of Skeletal Tissue—	
(a) Scoliosis	6
(b) Fusion ribs	2

All individuals suspected radiologically of having active tuberculosis were referred to their doctors or the Bureau. It is intended to enquire as to the patients' present condition and, if possible, to obtain comparative films or reports.

After analysis of the 32 cases of probable active and infectious tuberculosis it was found that only two of the subjects gave a history of being under treatment.

A man classified as having fibro-cavernous tuberculosis complained of lassitude and a slight cough. One young woman who had infiltration and cavitation was five months pregnant and stated that she had had a cough for years but had never had an X-ray examination, being told by her doctor that she had chronic bronchitis.

All subjects with cavitation were classified as having active and infectious conditions. Eight of the ten were between twenty and thirty years of age, the other two being aged thirty-seven and forty-seven years respectively.

The eight patients with acute infiltration were all between the ages of sixteen and thirty years, which is generally recognized as the most susceptible age group. None of them gave any history indicating lung diseases.

The thirteen patients with chronic fibroid tuberculosis were all between the ages of fifty and seventy years and had probably had the disease for many years, though only one gave a history of treatment for tuberculosis. They

all stated that they had been coughing for years but had never had an X-ray examination. The condition had probably reached a stage of "armed neutrality" between the bacilli and their powers of resistance. However, their degree of infectivity is probably high and the numbers infected by them through the years would be impossible to estimate. Treatment would not be much use in these cases, but facts regarding the possibility of infecting others, especially young adults, should be emphasized and precautions to avoid this should be stressed.

Only those with frank calcifications were classified as having calcifications which might be due to healed tuberculosis. One or two pinhead calcifications seen in films were ignored.

Twenty films showed definite calcified hilar glands with no obvious calcification in the lungs. There were six with the right side involved, three with the left and eleven with both sides affected. Two of the subjects were between three and five years of age, six between seven and ten years, six between thirteen and fifteen years, five between seventeen and twenty-two years and one aged thirty-seven years. One child was a known tuberculosis contact. None of them gave any history of tuberculosis. It is interesting to note that all except one were under the age of twenty-two years.

Twelve subjects had pulmonary calcified nodules besides the calcifications of the hilar glands, suggesting that they had had primary tuberculosis affecting glands and lung. All except one had only one portion of a lung involved; the one exception had both upper lobes affected. Their ages varied from seven to sixty-five years. Both hila were calcified in five, the right hilum in six and the left hilum in one.

Fifteen had apical calcifications, four having lesions on both sides, seven lesions on the left and four lesions on the right. One was aged twelve years, nine were between the ages of thirty and forty years, three between the ages of fifty and fifty-five years, two between the ages of sixty and seventy years. None of them gave a history of treatment, so their conditions were probably cases of mild infection of the secondary type.

Five had calcified nodules larger than a pea, either the so-called Ghon's focus or Assman's focus.

Two subjects had a large isolated nodule, the other three had several nodules. Three were between the ages of fifty and sixty years, one was aged fourteen years and the other seventeen years. None gave a history of treatment for tuberculosis and their conditions were probably cases of mild primary infection.

Sixteen subjects had numerous spotty calcifications localized in one area of the lung, six in the left upper lobe, nine in the right upper lobe or right lower lobe. Three were aged between eight and eleven years, two between fifteen and twenty-five years, nine between thirty and forty years, two between forty-five and fifty-five years. Only one of these had been treated for tuberculosis and two had sisters who were known tuberculosis sufferers. Three still had a cough. These had evidently had tuberculosis affecting a large portion of a lobe but had recovered without treatment. Though radiologically their lesions did not appear active, it is quite possible that they may still have bacilli in their sputum and they were referred for further investigation.

Five had areas of calcification in both upper lobes. Only one gave a history of treatment for tuberculosis. The findings in these cases suggested a bilateral lesion which as in the former group may be still infectious.

Thus there have been found 32 cases of presumably active and infective tuberculosis and 73 of apparently healed lesions; that is 3.2 per thousand individuals, which would make an estimated 320 in the district whose population is about 100,000. If two-thirds of the apparently healed lesions are only quiescent, the numbers would be raised to 5.6 per thousand, which makes 560 in the district or extended to Victoria 11,000. These figures indicate the importance of mass radiography in the efforts to eradicate this scourge by discovering early cases and controlling the spread of infection.

Table I contains a comparison of the figures for the first 10,000 X-ray films in Williamstown, which were nearly all reported on by the same radiologist as at Moreland.

The incidence of pulmonary tuberculosis seems to be definitely higher in Williamstown than in Brunswick and Coburg. That of cardiac enlargement and bronchitis does not show great variation. Probable bronchiectasis was more evident in the northern districts.

TABLE I.

Diagnosis.	Williamstown.	Moreland.
Possibly active tuberculosis	29	19
Chronic quiescent tuberculosis	25	13
Healed tuberculosis	134	73
Cardiac enlargement	121	104
Bronchitis	13	25
Bronchiectasis	12	24

Discussion.

The result of reports on all the microfilms in the various centres from July 1, 1944, to June 30, 1947, and including the 10,000 from Moreland, is shown in Table II.

TABLE II.

Date.	Number of Films.	Suspected Tuberculosis.	Active Tuberculosis.
30/6/45 ..	14,253	294	183
30/6/46 ..	15,451	478	110
30/6/47 ..	16,721	479	107
30/6/47 ¹ ..	10,000	105	56
Total ..	56,425	1356 (2.4%)	456 (0.82%)

¹ At Moreland.

Analysing these figures we found that in three years only 3% of the population of Victoria have had an X-ray examination by microfilms in six centres. This does not include X-ray films for those discharged from the services or those who have been examined by private radiologists or in public hospitals.

Brunswick and Coburg in twelve months with extensive canvassing induced about 10% of the people of the district to undergo X-ray examination and as in all other areas there is no charge made to the patient.

The figures so far indicate that about eight per thousand or 16,000 people in the whole State in apparent good health have some degree of pulmonary tuberculosis.

The average number of deaths from pulmonary tuberculosis in Victoria over the last five years is 740. This is one-third of what it was forty years ago, but the number has remained stationary during the last ten years and early diagnosis by X-ray is now the main weapon to use in reducing this figure.

Summary.

1. The findings from the examination of 10,000 microfilms at Moreland have been analysed in detail.

2. The figures obtained have been compared with those from 10,000 films prepared in Williamstown. The results from 56,500 films in the six mass radiography centres over the past three years have been tabulated.

3. Eight persons per thousand are considered to have radiologically active tuberculosis and, if this proportion is extended to the whole State, there are 16,000 cases of active pulmonary tuberculosis in apparently healthy people. Seven hundred and forty deaths from tuberculosis per year in Victoria is the average over the last five years, a reduction of one-third since forty years ago, but the number has remained unchanged in the last ten years.

Reports of Cases.

COARCTATION OF THE AORTA IN A MAN, AGED SIXTY-THREE YEARS.

By SIR CHARLES BLACKBURN,
Sydney.

THE number of patients with coarctation of the aorta who have been reported as reaching the seventh decade is small, so that it is of interest to add another to the list.

Clinical Record.

A male patient, aged sixty-three years, consulted me on January 27, 1948, on account of shortness of breath on stairs and hills for six months. His father, aged eighty-seven years, is living; his mother died at seventy-one years. He is a lift-driver.

As a youth his chief sport was foot-racing, and he states that he was a very good runner. He engaged in a variety of manual occupations up till 1914, and on the outbreak of war tried to enlist, but was rejected owing to his having lost the sight of his right eye as a child. From 1914 to 1930 he was a warehouseman. He lost his job in the financial depression, and from 1930 to 1934 did pick and shovel work. He was after that a "kitchen man" for a few years till he secured his present position. He is married and has two children. He smoked moderately up till four years ago and then gave it up, as it was difficult to get tobacco. He is a very moderate drinker.

He has had very good health and has very rarely had medical advice. As a child he lost the sight of his right eye owing to an injury. Three years ago he had breathlessness like the present attack and consulted a doctor, who told him that he had a high blood pressure and gave him some treatment, under which he improved greatly until six months ago.

Apart from some flatulent indigestion he has no other complaints. He sleeps very well and has always been spare, his weight being very constant at about eight stone three pounds.

He is a spare, healthy looking man, who appears younger than his years and exhibits no obvious distress. Apart from the cardio-vascular system, no abnormality was detected.

On the posterior chest wall there were several large palpable blood vessels following the lines of the intercostal spaces. These were somewhat tortuous, and there was a particularly large vessel over the ninth right intercostal space. A superficial systolic murmur was very readily heard over the back and was particularly loud over the above-mentioned large vessel. In each axilla there was a network of large, thick-walled, tortuous, pulsating vessels.

The heart was not easily defined, but appeared moderately enlarged, the apex thrust being palpable outside the left nipple. A soft systolic murmur was audible over the whole precordial region, loudest at the base of the heart. The pulse rate was 84 per minute, and the brachial blood pressure was 240 millimetres of mercury, systolic, and 110 millimetres, diastolic. It was difficult to palpate the abdominal aorta, but both femoral arteries appeared well filled. The systolic blood pressure reading of the left femoral artery was 110 millimetres of mercury. The diastolic reading was hard to determine accurately, as it seemed to vary, but it was about 90 millimetres of mercury.

The thorax was radiologically examined and the radiologist's report on the antero-posterior view is as follows:

The cardiac shadow shows evidence of some hypertrophy, but the degree of enlargement is not great. There is an absence of the usual aortic knob and notching on the inferior aspect of several of the ribs on both sides, especially the right. The lung fields appear clear and the skiagram does not show any evidence of calcification in the tortuous vessels in the axilla.

The oblique and lateral views have not demonstrated the shadow of the aortic arch.

These appearances confirm the clinical diagnosis of coarctation of the aorta.

Comment.

Coarctation of the aorta of the adult type is a lesion that is not very frequently recorded, there being only 200 in the series referred to in "Nelson's Living Medicine". In 1929, however, Andreessen reported four cases among 17,000 autopsies in Berlin, and if there is even one case among every 17,000 living people the condition must be much more common than has been thought.

No doubt many cases are missed; my patient has not had many medical examinations, but he has had a few, and had reached sixty-three years before his condition was detected. No doubt also many cases that are detected are not reported. I must plead guilty to not reporting two cases in my files in which the clinical and radiological findings were typical. One patient was a man, aged thirty-nine years, examined in 1939; the other patient, examined in 1943 when aged thirty-one years, was one of the less common female patients and almost certainly had also a patent *ductus arteriosus*.

Among the 200 cases mentioned by Maude E. Abbott in "Nelson's Living Medicine", ten patients reached the seventh decade and two others lived beyond seventy years, one of these two dying at the age of ninety-two years.

My patient will have to live another seven years before he will be able to join this very select group; but if he takes things quietly and is a little lucky he may manage it.

Acknowledgement.

I have to thank Dr. E. W. Frecker for reporting on the X-ray films and fluoroscopic examinations.

Reviews.

OPHTHALMIC NURSING.

The fifth edition of Maurice Whiting's "Ophthalmic Nursing" maintains its previous very high standard and should be in the possession of every ophthalmic nursing trainee.¹

When the review of the fourth edition was written, we expressed a hope that some improvement in the standards of ophthalmic nursing in Australia would be undertaken in the post-war years. Now, three years later, the position has not improved, but deteriorated. This is mainly due to the introduction of a forty-hour week for all trainees in nursing, but is also partly due to the fact that fewer girls are prepared to undergo the sacrifices which nursing entails.

"Ophthalmic Nursing" is again recommended to all ophthalmic nurses who have decided to make nursing their profession and not just another forty-hour week job.

PSYCHODRAMA.

The method of group psychotherapy described by J. L. Moreno in his book "Psychodrama" (Volume I) may best be understood by the presentation of a synopsis of an abridged case history reported in it.²

Mr. and Mrs. T. were asked to talk about their problems in the presence of an audience of other patients. During the first session Mr. T. told his wife that he was in love with Miss S., a fact that he had previously suppressed. At this point Mrs. T. was instructed to sit among the audience, and a woman took the role of Miss S. Mr. T. was told to

coach "Miss S." in her part by telling her about the real Miss S. Mr. T. then said that he wanted to marry "Miss S." and to get a divorce from Mrs. T.

In the next session Mr. T. and "Miss S." acted what had transpired the day before when he took Miss S. to dinner. On that occasion she had returned a keepsake which he had given her and said that she did not want to take him from his wife. Mrs. T. expressed satisfaction at this, but Mr. T. said that he would separate from her in the hope that Miss S. would change her mind.

Miss S. attended the following session and Mrs. T. was absent. Mr. T. and Miss S. then reenacted their relationship step by step, and the session ended with Miss S. saying she would like to marry him if he obtained a divorce.

Moreno comments: "Two roles in which T. showed a deep community of feeling with Miss S. were those of the poet and the adventurer (in which he and his wife had no contact), but the crux of the matter was that Mr. T. wanted to have a child (a boy) with Miss S. . . . Mr. T. asserted that he now realized why he had persistently avoided having a child with his wife, although they were compatible as lovers and although his wife was a fine home-maker. The later sessions were devoted to bringing the relationship between Mr. and Mrs. T. to an optimum equilibrium, in view of the probable outcome of the conflict. Mrs. T. tried every approach which might bring Mr. T. to consider a continuance of their marriage . . . It was to no avail. However, for her it had cathartic value. It strengthened her ego and prepared her for a life along new lines . . . A full catharsis for a separation and a divorce was attained."

This report illustrates the method of psychodrama and the theory of its action. It appears to the reviewer to be an application of that part of psychoanalysis known as catharsis which Freud relegated to a position of reduced importance as his technique developed. Apart from that, Moreno claims that impromptu psychodrama produces a greater degree of catharsis than that resulting from the prepared text of ordinary drama, not only for actors, but also for audience, because of the latter's greater participation. He suggests that in this age of mass production the need for self-expression is greater than hitherto, even for people who are unaware of emotional disturbances.

There is a section on "Psychomusic" which at its simplest consists of spontaneous singing without words before an audience, and another on therapeutic motion pictures and television, all of which are adjuncts of psychodrama. "Sociodrama" also appears to be an alternative term rather than a separate category of psychodrama.

SEXUAL ENDOCRINOLOGY.

"SEXUAL ENDOCRINOLOGY OF NON-MAMMALIAN VERTEBRATES", by L. H. Bretschneider and J. J. Duyvené de Wit, in collaboration with others, is a little book in an attractive paper cover, which bears a major inscription: "Monographs on the Progress of Research in Holland." It is apparently one of an unusual series, of which thirteen or so have been published.

A foreword by the editors explains that the purpose of the series is to show the world that scientists in the Netherlands have remained active during the five years of German occupation, and it explains certain conditions under which the volumes were written. It may be said at the outset that we cannot remember a publication in this form which is more beautifully set up. The print itself catches the eye immediately and the layout and diagrams provide a model of a standard which only a few printers or publishers reach.

The chapters of the volume under review cover an extremely interesting series of researches on sex and sexual endocrinology in the vertebrates, and although the stress is laid on the non-mammalian vertebrates in the title, the details are of importance to anyone interested in mammalian, and indeed, in human endocrinology.

The first chapter, for example, discusses the little fish—the bitterling—as a test object for endocrine experiments, but the experiments are with the mammalian steroid hormones—oestrone, oestradiol, progesterone and others, including andro-

¹ "Ophthalmic Nursing", by Maurice H. Whiting, O.B.E., M.A., M.B., B.Ch. (Cantab.), F.R.C.S., with Introduction by Sir John Parsons, C.B.E., D.Sc., F.R.C.S., F.R.S.; Fifth Edition; 1948. London: J. and A. Churchill, Limited. 7½" x 4½", pp. 148, with illustrations. Price: 7s. 6d.

² "Psychodrama", by J. L. Moreno; First Volume; 1948. New York: Beacon House. 9" x 6", pp. 448, with illustrations. Price \$6.00.

³ "Sexual Endocrinology of Non-Mammalian Vertebrates", by L. H. Bretschneider and J. J. Duyvené de Wit, in collaboration with S. Dudok de Wit, B. Van Egmond, M. A. Goedewaagen, H. Heintzberger, J. Van Iersel, Chr. Jaski, E. Van Koersveld, I. Kristensen, J. Meltzer, G. J. Van Oordt and C. Peisma, from the Laboratory for General Zoology, University of Utrecht; 1947. New York, London, Amsterdam, Brussels: Elsevier Publishing Company, Inc. 8" x 6½", pp. 156, with many illustrations. Price: 15s. net.

genic substances and glandular extracts such as testis and adrenal extracts. Reactions to the urine of pregnant women are described, and the authors conclude by stating that the ovipositor test with the bitterling is especially suited to the demonstration of small quantities of progesterone and, in particular, to the examination of the sexual hormones of lower vertebrates. They show further that there is a marked reaction to a new component—lutelidn—in human urine, and conclude that the bitterling ovipositor test is not suitable for human pregnancy diagnosis.

The second chapter contains a remarkably detailed investigation of the hypophysis of the bitterling with reference to the complex reactions between the stimuli of the outer world and the reproductive organs.

Chapter III describes the histology of the ovary and the histogenesis of *corpora lutea*. It is shown that the existence of secreting *corpora lutea* is probably widespread in vertebrates, and a clear account is given of the significance of the *corpora lutea* in the sexual endocrine organization of vertebrates. Finally, the sexual cycle (meaning the succession of changes in oestrus and anestrus) in a toad and in two well-known aquarium fishes is analysed.

Even though the scientists concerned in this work may have been precluded from contact with other recent workers in their particular field during the war period, the investigations described will be of considerable interest to those engaged in this branch of medical research as well as to zoologists and physiologists generally.

The book is well illustrated and concludes with a short bibliography and an index.

MEDICAL STATISTICS.

"AN INTRODUCTION TO MEDICAL STATISTICS" by Hilda M. Woods and W. T. Russell was first published in 1930 to fill the then urgent need for a small book suitable for a first reading in medical statistics.¹ It has now been reprinted as a second edition. It sets out simply the aims of vital statistics and then goes on to discuss the collection and tabulation of data. The authors give honourable mention here to the Cope-Chat (or Paramount) type of card, which, of course, deserves more use than it receives in clinical medicine, being overshadowed by the completely mechanized Hollerith type of card in popular appeal.

A few points on graphic presentation of data are then discussed. An excellent example of the distortion which may result when the zero line is omitted is given. The example chosen is the increasing circulation of a newspaper. Chapters are then devoted to each of the following population problems: standardization of the death rate, averages, measures of dispersion, correlation, the coefficient of regression and life tables. The discussion of each topic is confined to elementary level. Finally a chapter introductory to the theory of sampling is given. The diagram of the "normal curve" on page 115 (diagram X) has several defects which might well have been corrected for this edition.

This little book serves as a useful first reading for those interested in official statistics.

HANDBOOK OF COMMUNICABLE DISEASES.

The eleventh edition of "Handbook of Communicable Diseases for the Use of Medical Officers of Schools" consists mainly of a list of the various infectious maladies together with their epidemiology and statements of the periods for which sufferers and contacts are to be excluded from school.² The opening pages are devoted to short chapters on medical responsibility, general hygiene, medical administration, basic principles of health and disinfection; these more or less define the duties of school medical officers, and the booklet will prove useful to all such officers. However, for a book that is to be constantly in use, it is regrettable that it is bound only in a moderately stiff paper cover that will soon come apart.

¹ "An Introduction to Medical Statistics", by Hilda M. Woods and William T. Russell; Second Edition; 1948. London: Staples Press, Limited. New York: Staples Press Incorporated. 7½" x 4½", pp. 136. Price: 8s. 6d.

² "Handbook of Communicable Diseases for the Use of Medical Officers of Schools (Formerly a Code of Rules)", issued by the Medical Officers of Schools Association; Eleventh Edition; 1948. London: J. and A. Churchill, Limited. 8½" x 5½", pp. 72. Price: 5s.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Reproduction and Survival", by R. Christie Brown, M.B., M.S., F.R.C.S., F.R.C.O.G.; 1948. London: Edward Arnold and Company. 7½" x 4", pp. 108. Price: 6s.

The aim of reproduction and how it is achieved.

"Outline of Physiology", by William R. Amberson, Ph.D., and Dietrich C. Smith, Ph.D., illustrated by the late Norris Jones and William Loechel; Second Edition; 1948. Baltimore: The Williams and Wilkins Company. Sydney: Angus and Robertson, Limited. 10" x 6½", pp. 518, with illustrations, some of them coloured. Price: 37s. 6d.

A book intended for students, completely revised and with much new material added.

"A Short Practice of Surgery", by Hamilton Bailey, F.R.C.S. (England), F.A.C.S., F.R.S.E., and R. J. McNeill Love, M.S. (London), F.R.C.S. (England), F.A.C.S., F.I.C.S.; Eighth Edition; Part I; 1948. London: H. K. Lewis and Company, Limited. 8½" x 5½", pp. 238, with illustrations. Price: £2 12s. 6d.

The first part of a new and revised edition which is being issued in five parts at intervals of approximately two months.

"The Clinical Picture of Thyrotoxicosis", by Peter McEwan, M.A., M.B., Ch.B., F.R.C.S. (Edinburgh); 1948. Edinburgh and London: Oliver and Boyd. London: Macmillan and Company, Limited. 8½" x 5½", pp. 142, with illustrations. Price: 15s.

A monograph on a specialized subject written mainly for general practitioners.

"Practical Section Cutting and Staining", by E. C. Clayden, F.I.M.L.T.; 1948. London: J. and A. Churchill, Limited. 5" x 8", pp. 140, with illustrations. Price: 9s.

Written essentially for technicians with little or no experience in the various methods of preparing routine sections.

"Fearless Childbirth: What Every Mother-to-be Should Know", by Minnie Randell, O.B.E., S.R.N., S.C.M., M.C.S.P.; 1948. London: J. and A. Churchill, Limited. 7½" x 4½", pp. 107, with illustrations. Price: 3s. 6d.

A simple non-technical book which prospective mothers can read for themselves.

"Aids to Anaesthesia", by Victor Goldman, L.R.C.P., M.R.C.S., D.A. (R.C.P. and S.); Second Edition; 1948. London: Baillière, Tindall and Cox. 4" x 6½", pp. 226, with illustrations. Price: 7s. 6d.

Certain of the chapters have been rewritten and new ones added.

"Index of Treatment in Small-Animal Practice", by Hamilton Kirk, M.R.C.V.S.; 1948. London: Baillière, Tindall and Cox. 9" x 5½", pp. 786, with illustrations. Price: 40s.

A text-book for the veterinary practitioner on the treatment of the cat and the dog.

"Tuberculosis in Childhood", by Dorothy Stopford Price, M.D. (Univ. Dublin), with a chapter on Tuberculous Orthopedic Lesions and other Contributions by Henry F. MacAuley, M.Ch., F.R.C.S.I.; Second Edition; 1948. Bristol: John Wright and Sons, Limited. London: Simpkin Marshall (1941), Limited. 7" x 4", pp. 228, with illustrations. Price: 25s.

A revised edition of a brief practical guide to the diagnosis and treatment of tuberculosis in children.

"Advances in Pediatrics", by various authors; Volume III; 1948. New York: Interscience Publishers, Incorporated. London: Interscience Publishers, Limited. 9" x 6", pp. 376, with illustrations. Price: \$7.50.

Contains "eight personalized monographs of contemporary interest to both pediatricists and physicians in general practice".

"The Surgery of Abdominal Hernia", by George B. Maier, M.D., F.R.F.P.S.G., F.R.C.S.E.; 1948. London: Edward Arnold and Company. 8½" x 5½", pp. 408, with illustrations. Price: 25s.

Concerns the aetiology and treatment of abdominal hernia.

"Modern Surgery for Nurses", edited by F. Wilson Harlow, M.B., B.S. (Durham), F.R.C.S. (England), with a foreword by Sir Lancelot E. Barrington-Ward, K.C.V.O., M.B., Ch.M. (Edinburgh), F.R.C.S. (England and Edinburgh); 1948. London: William Heinemann (Medical Books), Limited. 8½" x 5½", pp. 820, with many illustrations. Price: 25s.

A survey for nurses of modern surgery and surgical procedures for the purposes both of examinations and of later reference.

The Medical Journal of Australia

SATURDAY, OCTOBER 23, 1948.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

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SOME ASPECTS OF THE ACCIDENT PROBLEM.

THESE are some subjects which need to be brought forward at regular intervals and often the same things must be said about them again and again. The essence of such subjects is that immediately the lessons learnt about them begin to be forgotten the effect of the forgetting becomes apparent. There is no better example than the accident problem. Accident-prevention campaigns undoubtedly bring results; a sufficient proportion of people respond to education and propaganda to influence the overall rate of accidents, but the effect wears off fairly quickly. So we have the attempt made through the formation of permanent safety organizations to sustain a continuous interest in the problem, propaganda being disseminated steadily and intensified at appropriate times. In a journal such as this the normal object is to stimulate thought by the presentation of new ideas, but even here it is appropriate to return to an old subject such as this when some fresh aspect can be brought forward and at the same time to say some of the essential things again. The average doctor, of course, has little opportunity to forget that accidents do happen. He sees the results all too frequently; but even then he may become blasé and cease to think behind the immediate situation to the community problem involved. It seems right to suggest that his responsibility professionally and as a citizen does not end with the repair or attempted repair of the damage done. Incidentally for those who are concerned to increase their ability to handle the results of accidents, attention is drawn to an interesting group of articles recently published.¹ In the first of these St. J. D. Buxton discusses first aid in road accidents from the doctor's viewpoint. He points out that because of the ready availability of ambulance transport doctors are rarely called on to render first aid in cities and large towns, but that sometimes, especially in the country, they are required to do so and then it is important that they should be acquainted with the principles of first aid. The giving of a course of lectures with close adherence to the syllabus and procedure

laid down in one of the standard first-aid manuals has been found useful by many doctors in getting a right perspective. In another article, on head injuries, Lambert Rogers suggests that the American practice of sending a medical officer with ambulances called to accidents would be particularly useful in the case of head injuries. The wisdom of this practice is apparent in all accidents, as Rogers points out, but it presents serious administrative difficulties in this country. Most of our ambulances are not based on hospitals, where medical officers would be readily available, and to make them so would require extensive reorganization involving many practical difficulties. Drastic interference with what is for the most part a satisfactory and smoothly working system is not to be undertaken lightly. The article by Rogers is worth careful perusal, as are the others of the series which deal with common fractures due to accidents, common accidents to the ears, injuries to the eyes in road accidents, anæsthetic accidents and injuries to the genito-urinary system due to road accidents.

Another interesting commentary on accidents comes from a plastic surgeon, C. L. Straith, of Detroit,¹ who groups accidental injuries to occupants of the front seats of motor-cars into "steering post injuries" (those sustained by the driver) and "guest passenger injuries" (those sustained by others in the front seat). He provides rather startling facts to show that the seat beside the driver (dramatically termed the "death seat") is much the most dangerous position in the car. The rear seat is relatively safe, but those sitting beside the driver are injured in the proportion of 3:1 as compared with drivers. These front seat injuries are most often due to sudden stopping of the car, and the two main factors to be considered in their prevention are speed of travel and interior design of cars. Straith describes the head injuries sustained by "guest passengers" in three groups occurring when the passenger is thrown forward (a) into the windshield, (b) into the windshield, the head being deflected down on the dash, (c) directly against the dashboard. He refers particularly to the danger to infants and children of having their faces or skulls crushed against the dashboard. Three aspects of prevention for these types of accident are suggested: enforcement, education and engineering. Speed is still rated as the greatest cause of accidents in surveys that he has studied, and so enforcement of speed limits and other traffic regulations is essential. Education may be applied in many directions, for example, to drivers, with the appeal not to endanger their "guest passengers" by reckless driving or by drinking before driving, and to mothers, making them understand the need of holding babies tightly, placing them in proper carriers and keeping them from standing in the front. Engineering preventive measures relate to interior motor-car design: the protection of the driver by collapsible steering columns, the raising and padding of the lower edge of the dashboard to lessen knee injuries and reduction in the number of floor pedals to minimize ankle injuries; the protection of "guest passengers" by the removal of sharp edges and projecting objects from the dashboard and the provision of a detachable crash pad which covers the dashboard, a simple device which should be of real value.

¹ The Medical Press, June 30, 1948.

¹ The Journal of the American Medical Association, May 22, 1948.

It may still be asked just what particular relevance all this has to medical practitioners. They must, of course, as citizens, be concerned with the fact that the incidence of accidents remains high. As an example, in the year ending June 30, 1948, road accidents in New South Wales caused 508 deaths (16.9 per 100,000 of population) and the injury of 8557 persons (285.7 per 100,000 of population). *Road Safety*, the official journal of the Road Safety Council of New South Wales, points out that analysis of the year's statistics shows that there have been an increase in public interest in the safety campaign, an improvement in road behaviour and a definite decline in the numbers killed and injured, but that the figures are still serious. Such facts will concern every citizen, but it is not our place to deliver a homily on citizenship. On the other hand there are certain useful possibilities which do lie in the doctor's hands. An interesting list of these has been put forward by E. Press.¹ He refers to the road safety plan of engineering, education and enforcement already mentioned and then turns his attention to home safety. He suggests that advantage be taken, at the time of inoculation of infants, of the mother's commonly stated or implied wish to avoid suffering for the infant even at her own expense, to press home the prevention of suffering that can be achieved by deliberate safety measures in the home. He refers to the use of home safety check lists (apparently issued by health departments and safety councils in the United States) which the mother can take home and which the physician may later review. As far as we know such lists are not available in this country, but the idea may be worth the attention of some suitable agency. Press also suggests that the occurrence of minor injuries which the doctor is called to treat may provide opportunities for similar propaganda (due tact being observed). Two major suggestions are made regarding drivers of motor vehicles: firstly, that epilepsy, alcoholism, addiction to drugs, Ménière's syndrome and other diseases likely to affect capacity to drive safely should be reportable in confidence to the proper authorities, who should be able to revoke or deny licences where necessary, and, secondly, that routine physical examination be required for drivers with particular attention to regular and stereoscopic vision, hearing and reaction time. There are plenty of practical difficulties in the way of adoption of either of these suggestions, but neither political expediency nor administrative difficulty can justify their outright rejection or shelving. Another good suggestion that should have medical approval is the wearing by civilians, especially small children and lone adults, of identification tags (similar to those worn by servicemen) providing such information as blood group, presence of serum sensitivity, abnormal bleeding tendency and tetanus immunization. Press also refers to bicycle safety programmes (most important but difficult) and to the possibility of establishment of mental hygiene clinics for accident-prone children. He closes with a plea for more interest in accident prevention by public health departments and by schools of public health, pointing out, just as an example, that the total death rate in the United States in 1944 from the major water-borne and food-borne diseases, the diseases of pregnancy and pellagra was 58.0 per 100,000 as against a death rate from accidents of 71.8 per 100,000. There

are, of course, many qualifications to this comparison, but its essential implications are valid and striking. They form grounds for urging interest in accident prevention among all practitioners, teachers of medical students and public health authorities in these days of the rising prestige of preventive medicine.

Current Comment.

INTERNATIONAL DRUG CONTROL.

ONE piece of international machinery that has, despite certain glaring exceptions, achieved a real measure of success is that set up by the Convention of 1931 for Limiting the Manufacture and Regulating the Distribution of Narcotic Drugs. This machinery has now passed into the hands of the United Nations Organization and two United Nations publications recently received provide interesting details regarding respectively the control of the lawful use of and the illicit traffic in narcotic drugs.

The first publication¹ is the Statement (issued by the Supervisory Body constituted under article 5 of the Convention) regarding the estimated world requirements of narcotic drugs in 1948. A statement of this type is issued annually, but there are features of particular interest about the one under review. One feature is the inclusion of the first annual estimates for metopon; these were furnished by the United States of America, where the drug is manufactured, and as a result metopon can now be brought under international control. Another is the reference to narcotic synthetic drugs which have effects comparable to those of morphine and its derivatives and are capable of creating addiction; particularly mentioned is the drug known under various names including pethidine, "Demerol" and "Dolantin". The Convention of 1931 cannot apply to synthetic drugs, but steps are being taken to bring them under control. The opinion is expressed that, in so far as these new drugs come into use, they should operate to reduce the estimates for the older drugs such as morphine and its derivatives. The last feature of particular interest in this publication is the statement of the purposes and methods of the Supervisory Body included in anticipation of its imminent reconstitution under the auspices of the United Nations. It is explained that the estimates of dangerous drugs accepted by the Supervisory Body form the basis on which the control over the international trade is exercised, and fix the limits within which manufacture may take place, so that their accuracy is important. The function of the Supervisory Body is to examine these estimates supplied by governments of the amounts of the different drugs required for the needs of their countries; the Convention provides that the estimates, as far as they relate to domestic consumption, are to be based solely on the medical and scientific requirements of the country. The Convention suggests no criteria for assessing these requirements, but stipulates that every estimate shall be accompanied by a statement explaining the method by which the several amounts shown in it have been calculated. Unfortunately the explanations are mostly inadequate or not furnished. Judgement has to be based on available information regarding the development of the medical services of the country, on amounts actually used in previous years, and on other information about the conditions in the country concerned, particularly as to the efficiency of the national system of control over the trade in and use of the drug; assessment of this control is helped by the experience of the last twenty years. The Convention which established the control system is universal in its application to all countries. The statement concludes:

This control has been justified in practice and receives the full support of nearly all governments in the world:

¹ The Journal of the American Medical Association, November 29, 1947.

² "Estimated World Requirements of Narcotic Drugs in 1948", United Nations, Geneva, 1947. Price: 2s. net.

and the quality of the estimates has steadily improved. The system has stood the test of the upheaval caused by the war and the disorganization of the governments' services and . . . is again [November, 1947] in full operation.

The second publication¹ deals with illicit traffic in narcotic drugs and consists of a review of world traffic from January 1, 1940, to June 30, 1946, with a memorandum on world trends during the 1939-1945 war. Only a few points can be mentioned from the mass of summarized detail. Considerable quantities of raw and prepared opium were seized in various parts of the world, but available data (which were rather meagre) suggested that the traffic in morphine was rather insignificant in comparison with that of pre-war years. The heaviest seizures of heroin were made in the United States, according to available information, but a real insight into the illicit traffic in this drug was obscured by Japanese and German occupation of the territories in which the trade flourished prior to hostilities. The illicit traffic in codeine appeared to be of little consequence. The illicit flow of cocaine out of Japan was so much diminished by the war that the traffic in this drug "slowed to almost a trickle". The heaviest flow of cannabis was out of Syria through Palestine to Egypt, and large quantities of hashish were seized in Egypt, Palestine and Syria. Ganja, bhang and charas were seized in India in considerable amounts, and in the United States marihuana seizures were large. As a general rule it was considered that the war during its first years exercised a restrictive influence on the methods of the international illicit traffic, but in spite of obstacles the traffic has continued to exist, new sources and channels of supply arising to replace those interfered with. The ingenuity of smugglers and addicts would put to shame the writer of romantic novels, but it seems often to have been matched by the ability of government officers. Fluoroscopy aided detection of drugs carried in stomachs both camel and human—one woman, aided by an emetic, produced 31 packages of heroin in rubber finger-stalls. Addicts employed all their usual devices, but it is disturbing to see references from a number of countries to laxity either casual or deliberate in the issuing of medical prescriptions. With regard to the general situation in individual countries reference must be made to that in China, where in areas under Japanese occupation the production and consumption of narcotics, particularly opium and heroin, were deliberately fostered by the occupation authorities; so-called "opium suppression" bodies were in fact agencies for the sale of narcotics. From the occupied areas drugs were sent into the unoccupied areas. The Chinese National Government adopted a vigorous policy, especially in relation to areas which were later liberated, and has achieved much, but the Japanese left an evil legacy which should not be forgotten. They openly and certain other countries more subtly have defied world opinion on narcotic drugs, but genuine international concern on this problem has allowed a great deal to be achieved and we may well expect much more in the future, whatever we may think of the effectiveness of international cooperation in other matters.

FOCAL INFECTION AND THE TEETH.

MUCH attention and much significance were given to the septic focus not many years ago, and a multitude of teeth, tonsils and other appendages or tissues were sacrificed to appease it. It seems now to have had its little day and is rarely mentioned in scientific discussions. It is not, however, pretended that the subject is settled and its practical corollaries constantly claim the attention of such people as dentists and ear, nose and throat specialists. Recently a group of dentists at the Institute of Dental Research of the United Dental Hospital of Sydney invited H. K. Ward to discuss focal infection

with them,¹ and much of what Professor Ward said is of general interest. He pointed out that the theory of focal infection in relation to dead teeth was based on three assumptions: (i) that the region at the apex of a dead tooth—showing up as an area of rarefaction in a radiogram—is infected; (ii) that from that area of infection toxins are absorbed through the lymph and blood channels; (iii) that these hypothetical toxins exert their action on susceptible tissue in various parts of the body. The evidence bearing on the first assumption is apparently conflicting so that it is unproven. The toxin essential to the second assumption has yet to be demonstrated. The third assumption brings forward the problem of the many individuals who have a "focus of infection" with no apparent ill effects and evokes in its turn further assumptions such as the influence of allergy—"one of those gorgeous words which can be relied upon to blanket our ignorance". As Professor Ward said, no one would take exception to the removal of a tonsil, an appendix or a dead tooth because of persisting local pain or discomfort, "but to remove them in the hope of curing a systemic disease is something else again and is merely clutching at a straw". The hypothesis of focal infection is quite legitimate, but it must be supported by convincing evidence and not be adopted just as a dogma. On the other hand it is necessary to share Professor Ward's appreciation of the danger of becoming a "negative dogmatist" on the subject.

Incidentally it is important to realize, whatever one's views may be on focal infection, that extraction is not the only means of dealing with an infected or non-vital tooth. Natural teeth are still the best for chewing purposes and their preservation is worth while. In another discussion of the same group² A. J. Arnott drew attention to the toleration by the tissues of sterile foreign bodies, such as stainless steel wire used in the treatment of fractured jaws, and suggested that, if an infected or devitalized tooth could be converted into a sterile body, it was reasonable to expect that that tooth could be retained. J. S. Lyell and H. R. Sullivan discussed the technique, which need not concern us here, but it seems clear that in appropriate cases it is a sound procedure. There are no doubt some who will not feel happy about any of these ideas, being convinced of the menace of focal infection and of the necessity for extraction to deal with an offending tooth. It must be conceded to them that the question is still an open one, but the flood of supporting clinical evidence that should have been forthcoming before this has not been evident.

PLAGUE IN CALCUTTA.

CALCUTTA has recently experienced a short sharp outbreak of plague after being free of the disease since 1925. The details are presented in a series of articles in the *Indian Medical Gazette* with a discussion in a leading article of the general features of the epidemic and of the history of plague in India.³ The epidemic lasted for approximately three months; there were not more than 147 cases with 30 deaths. The mortality was high at first (probably from lack of treatment and nursing) and then dropped. Treatment measures were effective, sulphonamides being given to those with infections of ordinary severity and streptomycin to the gravely ill. The deaths appear to have been related to poor living conditions and coincidental disease, especially tuberculosis. Prophylactic inoculation of vaccine was popular and apparently effective. A vigorous drive was made on rats (with lethal gas) and fleas (with DDT) and the city cleaned generally; the leading article makes bitter comment on the vast hoards of blackmarket food and clothing which "must be the nurseries of rats and fleas". Though the investigating epidemiologists urge caution, the epidemic is apparently over; the most pleasing feature is in the comment that "the sulpha drugs and streptomycin have deprived the fell dragon of plague of its teeth and claws".

¹ "Illicit Traffic in Narcotic Drugs. I. Review of World Traffic from 1 January, 1940, to 30 June, 1946. II. World Trends during the War 1939-1945", United Nations, Lake Success, New York, 1947. Price: 2s. 6d. net.

² *The Dental Journal of Australia*, September, 1948, page 315.

³ *Ibidem*, page 322.

⁴ *Indian Medical Gazette*, March, 1948.

Abstracts from Medical Literature.

DERMATOLOGY.

Relation of Keratosis Seborrhœica and Keratosis Senilis to Vitamin A Deficiency.

W. B. DUBLIN and BERNICE M. HAZEN (*Archives of Dermatology and Syphilology*, February, 1948) state that it has been shown that deficiency in vitamin A results in follicular hyperkeratosis. Other lesions, including xeroderma, alopecia, ichthyosis and lichen planus, have been attributed to the same deficiency. The authors found no reference in the literature to the possible part played by vitamin A deficiency in the development of *keratosis seborrhœica* and *keratosis senilis*. In this study 100,000 units of vitamin A were given daily for an average period of 19.8 months to a group of fifty patients. The effect of treatment was manifest, although slow in appearing. *Keratosis seborrhœica* and *keratosis senilis* responded similarly to the administration of the vitamin. Usually after three or four months lesions began to regress, with flaking of keratin. The lesions became gradually smaller and softer and more translucent. In thirteen cases all grossly identifiable lesions disappeared completely. In five instances no improvement resulted. In the remaining 32 cases improvement in some degree could be seen. The authors conclude that vitamin A deficiency appears to play some part in the development of *keratosis seborrhœica* and *keratosis senilis*, but is not solely responsible.

Neurodermatitis of the Scalp.

W. H. BROWN (*The British Journal of Dermatology and Syphilis*, March, 1948) states that during the war years he saw an unusually large number of patients whose condition he had to classify under the heading "neurodermatitis". The affection occurred chiefly in adult women who had been subjected to much extra nervous and physical strain. Some women were at the menopausal period, but this factor did not seem an important one. The neurodermatitis generally involved the face, neck and ears and was sometimes accompanied by recurring attacks of angio-neurotic oedema. The scalp was frequently involved. The author states that when the scalp is involved the clinical picture is that of a scaly dermatitis with considerable variation in the degree of scaliness. Sometimes it is a mild, branny scaliness simulating *psoriasis simplex*. At other times it is more pronounced and simulates a scaly, seborrhœic dermatitis, except that scales are generally silver white and rarely greasy. It is not uncommon for patients with neurodermatitis involving the scalp and face to be referred by the practitioner as seborrhœic dermatitis. The clinical picture may closely simulate psoriasis of the scalp. The author emphasizes that in some cases the scales become large, pearly or asbestos-like, run up the shaft of the hair, and when separated form cylindrical bundles, presenting the typical picture of *tinea amiantacea* or "*fausse tigne amiantacée*". The areas presenting this feature are localized to one or two sites, generally the posterior

half or lateral aspects of the scalp. The author has substituted the term *psoriasis amiantacea* instead of the term *tinea amiantacea*, because the condition appears to him to have no relation whatever to *tinea*. The author describes eight cases in detail. His observations lead him to believe that neurodermatitis frequently involves the scalp. Sometimes the scalp is involved alone in neurodermatitis, but this is rare. The clinical picture of *psoriasis amiantacea* has appeared most frequently, in the author's experience, in neurodermatitis of the scalp. The asbestos scaling was unequivocal in fourteen cases and striking in nine. The author states that pleurodermatitis may be localized to the concha and the external auditory meatus, and that this also does not appear to be generally recognized. If the underlying neurogenic factor is not recognized the treatment outlined will probably not be effective. Small doses of X-ray therapy are essential, also an antipruritic cream containing 5% oleate of mercury for local application and a sedative mixture.

Pruritus Vulvæ from Rubber.

C. H. V. CLARKE (*The British Journal of Dermatology and Syphilis*, February, 1948) reports a case of *pruritus vulvæ* in a woman, aged twenty-seven years, which was due to a rubber condom; and suggests that this is possibly quite a common though unrecognized cause in many instances of *pruritus vulvæ*. The irritation was due to the presence of alkali from a stabilizer in the rubber, namely, potassium oleate; extraction of a sheath with water showed that there was in fact a considerable amount of free alkali present.

Generalized Exfoliative Dermatitis due to Penicillin.

J. O. SHAFFER (*The New England Journal of Medicine*, May 6, 1948) reports a case of generalized exfoliative dermatitis due to sensitivity to penicillin. The patient had been treated for *impetigo contagiosa* of the face. The condition improved on local treatment with penicillin ointment for three days, but on the fourth day coalescing vesicular lesions covered with honey-like material on an erythematous base had spread beyond the original affected area. The penicillin ointment was continued for another two days. On the sixth day the individual lesions had improved, but an erysipelatous lesion had appeared involving the skin more deeply and covering the entire area over which the ointment had been applied. There was no systemic toxicity to suggest a true erysipelas. The eruption had spread next day, so 30,000 units of penicillin were injected and repeated every three hours. No improvement resulted and on the ninth day a fine maculo-papular eruption appeared on the scrotum and inner aspects of the thighs. Penicillin was discontinued immediately. The skin lesions deepened in colour and within the next seven days a generalized exfoliative reaction appeared on the entire body surface. Though the *impetigo* of the face and neck did not respond to either local or intramuscular administration of penicillin, it disappeared after five days of treatment with ammoniated mercury ointment. The author considers that if the penicillin injections had been continued intramuscularly after the occurrence of the generalized rash a fatality might

have occurred. Sensitivity induced by local therapy may prevent the use of parenteral penicillin therapy when a severe systemic infection later occurs. The author considers that penicillin ointment is contraindicated in the treatment of skin lesions.

Cutaneous Manifestations of Gonococcal Infection.

J. S. MIALl AND W. V. SINGLETARY (*Archives of Dermatology and Syphilology*, February, 1948) state that cutaneous lesions due to infection with the gonococcus are generally divided into two groups. The first group is produced by invasion from without, and includes intertriginous erythema, erosion, serpiginous ulceration, folliculitis and rarely tumour-like granuloma. In the second group, in which a hæmatogenous mode of infection is postulated, are usually placed the exanthematic lesions and *keratosis blenorragica*. *Keratosis blenorragica* consists of the syndrome of urethritis, cachexia, involvement of the joints, and cutaneous eruption with involvement of nails and nail beds. The lesions usually occur symmetrically, on the trunk and extremities, especially on the palms and soles, in the form of layered cornified crusts. They begin as small inflamed papules, progressing to form cornified areas which when removed leave a reddened, finely nodular but non-weeping base. The lesions on the face and trunk are small and discrete; on the feet and hands they coalesce to cover large areas. The authors describe a case in detail giving physical examination, laboratory observations, pathological report and treatment. Sections stained by the Gram technique showed doubtful Gram-negative diplococcal bodies in some of the leucocytes in the corium and in the parakeratotic layer. In the sweat glands there were numerous Gram-negative intracellular diplococci, which were typically biscuit-shaped. After diagnosis was established the patient was given 100,000 units of penicillin sodium over a period of twenty-five hours. After forty-eight hours penicillin therapy was resumed, 10,000 units being given intramuscularly every four hours. By the time 2,200,000 units had been given the cutaneous lesions had entirely disappeared.

Technique and Problems of X-Ray Epilation.

F. C. COMBES AND H. T. BEHRMAN (*Archives of Dermatology and Syphilology*, January, 1948) discuss the recent epidemic of ringworm of the scalp in the United States of America. They state that the major weapon of control in the so-called "human" type of case is X-ray therapy. This in skilled hands produces the greatest number of cures. The patient's scalp hair is first shaved and allowed to grow a little or clipped closely. If the hair is more than a quarter of an inch long it acts as a mechanical filter. Pustulation or thick crusts in the scalp should first be controlled with wet dressings or antiseptic ointments. Questions should be asked regarding previous treatment. The authors have advised the daily use of tincture of green soap followed by ointments containing 5% and 10% sulphur or ammoniated mercury both before and after epilation; there have been no instances of undesirable sequelæ and they believe that the percentages of

failures, recurrences and spread to other children have been smaller as a result. For three weeks prior to and following epilation a salve containing 3% ammoniated mercury is advised. For the next three weeks the strength is increased to 5% and finally to 10%. The 10% ammoniated mercury ointment is used until the patient is discharged from treatment. The authors question whether the infection disappears spontaneously with the onset of puberty. They have seen several patients, aged fourteen, fifteen and sixteen years, and even adults with *tinea capitis*. The detailed technique of X-ray application is described. The only real danger of X-ray epilation is permanent alopecia. In a certain percentage of cases the defluvium may not be complete or reinfection may occur from contaminated hats, articles of clothing, other children or infected members of the same family. If patches of fluorescent hairs are still present they should be removed manually under Wood's light. The authors do not repeat the X-ray treatment under nine to twelve months. In the average case the patient may be considered cured if an examination under Wood filter fails to reveal fluorescence of the hair on two successive occasions separated by a three-week interval.

UROLOGY.

Reiter's Syndrome.

R. J. G. MORRISON AND M. THOMPSON (*The Lancet*, April 24, 1948) report nine cases of Reiter's syndrome. Arthritis, conjunctivitis and urethritis are the triad of symptoms which Reiter described. In the cases reported a urethral discharge (which was related to sexual intercourse in four instances) occurred, associated with arthritis mainly in the knee joints. Conjunctivitis also was recorded in all these cases, and morbilliform or other rashes noted. The joint condition was associated with effusion, stiffness or periarticular swelling. Little response was observed to treatment with sulpha drugs or penicillin, but all patients recovered; the intravenous injection of "T.A.B." vaccine appeared to have beneficial effects. The cause of the condition is uncertain. The cases reported were all in soldiers below the age of thirty years.

Bacillus Coli and Bacillus Proteus Infection of the Urinary Tract.

LESTER NARINS (*The Journal of Urology*, January, 1948) states that the management of chronic urinary tract infections, especially those caused by *Bacillus coli* and *Bacillus proteus*, often poses a very difficult problem. The whole array of modern chemotherapeutic and antibiotic agents may be tried in some of these infections, with ultimate failure even when streptomycin is used. Penicillin is notoriously ineffective. It was decided to investigate the therapeutic value of a new sulphonamide, namely, 3,4-dimethyl-5-sulphanilamido-isoxazole, supplied under the designation NU-445. This drug has proved effective against the two types of organisms in question, both *in vitro* and *in vivo*, and is distinguished by extremely low toxicity. It is also very soluble. The drug was administered to fifty consecutive patients with urinary infections due to *Bacillus coli*,

Bacillus proteus, or both combined. The dose varied from six to eight grammes per day. In most cases the period of treatment was twelve days or less. To satisfy the criterion for cure, negative results from cultures were required for at least two weeks after cessation of treatment. Cases of clinical improvement without bacteriological cure were not counted as positive results. It was found that the *Bacillus coli* infections responded better than the *Bacillus proteus*. The larger doses proved to be more effective. The best results were obtained in cases of uncomplicated acute and chronic cystitis or pyelonephritis not requiring prolonged drainage.

Hypertension in Renal Disease.

H. S. SABIN (*The Journal of Urology*, January, 1948) reviews briefly the experimental work concerning the renal origin of hypertension. He states that the theory that interference with the circulation of one or both kidneys may cause liberation into the blood-stream of a pressor substance has much experimental existence in its favour. Up to the present time, however, this pressor substance has not been successfully demonstrated in the peripheral circulation of human beings or experimental animals with hypertension. The author has analysed 100 cases from the literature in which nephrectomy was performed in the presence of unilateral renal disease associated with hypertension, and has added one of his own. In 51 of these, the blood pressure returned to normal, although 21 of the patients had been followed for less than one year. Twenty-three showed some reduction in blood pressure, but not to normal levels, while in 26 no improvement occurred. The commonest pathological condition found was chronic pyelonephritis associated with renal atrophy. The cases of hypertension which may be cured by nephrectomy are comparatively rare. Great care should be taken in evaluating the functional capacity of both kidneys before operation is contemplated. Compensatory hypertrophy of the healthy organ is a good indication of a successful outcome.

Retropubic Prostatectomy.

T. MILLIN (*The Journal of Urology*, March, 1948) claims that his operation for prostatic adenomectomy, performed by the retropubic prevesical approach, is gaining favour in various clinics in Europe and America, at the expense of the transvesical and perineal approach. He considers that, excluding median vesical bars, for which endoscopic resection stands supreme, the great majority of patients have an easier urethral convalescence, with little dysuria, after retropubic prostatectomy. He thinks that visualization of the prostatic bed is better in the retropubic operation than in the operations with greater possibility of effective haemostasis by catgut suture. The author claims a mortality of a little less than 5% in 400 cases, and quotes a total of about 1500 operations performed by other surgeons as well as himself, the average mortality being only a little over 5% in the whole group.

O. S. LOWSLEY AND A. GENTILE (*The Journal of Urology*, March, 1948) have tried out Millin's operation of prevesical prostatectomy in 28 cases, and they publish an illustrated description of the

operation and give their results. They state that this approach was first used by Van Stokum, of Holland, in 1909, but was more fully developed in 1933 by L. C. Jacobs and E. J. Casper, of San Francisco, who were quite unaware of Van Stokum's use of the prevesical approach. In 1945 T. Millin, of London, developed and carried out his own technique of "retropubic" prostatectomy. The attack on the prostatic adenoma is made more directly than in the usual transvesical approach. The vertically running veins on the prostatic capsule are ligated and divided to allow a bloodless transverse incision through the true and the surgical capsules of the prostatic adenoma. When the latter is enucleated by blunt dissection the urethra is cut across at the distal end of the adenoma, haemostatic sutures or electrocoagulation are applied for bleeding control, and a Foley balloon catheter is passed into position so that its distended bag controls residual bleeding in the cavity. The tip of the catheter lies in the bladder, which has not been opened at all. The wound in the prostatic capsule is then closed, and a small prevesical drain is left in. The catheter is removed after the urine is clear of blood, but never before four days have passed. The patients are up in a chair, if possible, on the second day. There was no mortality in this series of 28 cases. The authors believe that this type of prostatectomy has a smoother convalescence and shorter hospital stay than other types.

Oestrogens in Plastic Penile Operations.

V. VERMOUTEN (*The Journal of Urology*, November, 1947) reports that, in a series of 454 circumcisions, oestrogenic hormones were used to determine the effect on erections after operation. Subsequently this method was used to control erections after other plastic operations on the penis. The results were very good and stress on the suture lines was avoided; this allowed primary healing. Stilbestrol, in doses of four milligrammes daily by mouth, controls 50% of erections following penile operations. If the dose is increased to six milligrammes daily, nearly 75% of erections are prevented.

Metastatic Tumours of the Ureter.

D. PRESMAN AND L. ERLICH (*The Journal of Urology*, March, 1948) report two cases of true metastatic tumour of the ureter, and review the rest of the literature, which consists of only 35 reports of cases. The diagnosis has usually been made at post-mortem examination, or from a removed surgical specimen. The most common sites of the primary lesion were the prostate and the stomach. Symptoms and signs due to ureteric involvement were present in about one-half of the cases. Pain in the loin, elevation of the blood urea level, anuria and haematuria occurred in that order of frequency. In 90% of the cases there were metastases to other organs and structures of the body, but levels of the ureter were involved with equal frequency. Bilateral ureteric metastases occurred in about 60% of all cases. In about 40% of cases the lesion was of a diffuse infiltrating type; in 66% localized nodules were present. In about 70% of the patients ureteric occlusion, partial or complete, produced hydronephrosis and hydronephrosis.

British Medical Association News.

SCIENTIFIC.

A MEETING of the New South Wales Branch of the British Medical Association was held on December 4, 1947, at the Saint George Hospital, Kogarah. The meeting took the form of a number of clinical demonstrations by the members of the honorary staff of the hospital. Parts of this report appeared in the issues of July 3, 24 and 31 and August 7, 1948.

Fibroangi endothelioma.

DR. A. L. WEBB first showed a male patient, aged nineteen years, who had had swellings in the thumb and index finger of his left hand for as long as he remembered. Examination showed that the volar surface of both the thumb and index finger was occupied by a large, irregular, soft, semifluctuant swelling. As there was disability in the index finger it was decided to operate on this finger. A pre-operative diagnosis of diffuse lipoma was made. At operation a tumour was removed which occupied the whole length of the tendon and at its proximal end was continuous with normal tendon tissue. The tumour was about two and a half inches long, was conical in shape, and was about a quarter of an inch in diameter at its proximal end and five-eighths of an inch at its distal end. Examination of sections showed that the tumour was a fibroangi endothelioma.

PROFESSOR W. K. INGLIS pointed out that other elements besides the blood vessels were affected, and that the disturbance was a developmental abnormality. The condition was known as Albrecht's hæmatoma.

Osteogenic Sarcoma.

Dr. Webb next showed a female patient, aged ten years, who had been admitted to hospital with a complaint of pain in the left knee joint on walking. She had noticed the pain for about six weeks previously. About three weeks before her admission to hospital she had ricked her knee at school, and after this had been confined to bed by her doctor and treated as possibly suffering from osteomyelitis. When admitted to hospital she had mild fever (temperature 99.8° F.) and tenderness was present over the medial femoral condyle. Moderate swelling was present above the knee joint with limitation of movement. X-ray examination of the lower end of the femur revealed an osteogenic osteolytic lesion limited below by the epiphysis. A pathological fracture was present. Dr. J. A. Vote considered that the appearances favoured osteogenic sarcoma rather than chronic osteomyelitis. Deep X-ray therapy was carried out by Dr. F. Duval. After the effect of a full course of this had been observed, it was agreed that operation offered the best chance of survival. Consequently, on July 15, 1947, approximately three and a half months after the onset of symptoms, disarticulation at the left hip joint was carried out, and on August 3 the patient was discharged from hospital, walking on crutches.

Examination of sections revealed the characteristic appearance of osteogenic sarcoma. The pathologist presented the following report. Macroscopic examination of the specimen, which was the lower two-thirds of the femur with the surrounding soft tissues, showed that the metaphysis was the site of a growth involving a little less than the lower third of the bone. Subperiosteal extension of the growth had occurred, and there was a pathological fracture two inches above the epiphyseal line. Microscopic examination showed the histological structure to be that of osteogenic sarcoma. Femoral lymph nodes were examined. On macroscopic examination the specimen was seen to consist of two enlarged glands with an hæmorrhagic appearance. On microscopic examination both glands were seen to have a similar histological appearance. The vascularity was greatly increased, and many dilated thin-walled blood vessels were present. The germ centres (so called) of the lymph follicles were particularly prominent. The histological appearances were those of inflammation, and no evidence of infiltration by tumour cells was to be seen.

Lesions of the Hip Joint.

Dr. Webb then presented three patients with various conditions affecting the hip joint.

The first was a man, aged fifty-two years, who had been referred on account of intractable pain in the left hip for many years, as well as pain in the left knee. Examination at that time revealed limitation of all movements at the hip joint with flexion-adduction deformity. Treatment was

operative, and consisted in the application of a vitallium cup to the head of the left femur on March 15, 1945. Dr. Webb pointed out that there was still much limitation of movement at the hip joint as well as almost fixed flexion-adduction deformity. The thigh muscles were grossly wasted and shortening was at least one and a half inches. And yet, in spite of all that, the patient had worked continuously as a labourer and had not missed a day's work since his recovery from the operation. He said that in general he had no pain in the joint, and that the more weight he put on it, the better it felt. As a matter of additional interest it was pointed out that on the evening of the meeting, after his usual heavy day's work was finished, the patient had walked two and a half miles from his home to the hospital.

The next patient was a female, aged seventy-three years, and a known diabetic. In 1945 she had fractured the shaft of her right femur. On April 26, 1946, she had sustained a subcapital fracture of the neck of the right femur. A few days later, after stabilization of the diabetic condition, a Smith-Petersen nail was inserted into the neck of the right femur. After an uneventful convalescence this patient was discharged from hospital on June 5, 1946, wearing a walking caliper. The following year, on July 11, 1947, in another fall a pertrochanteric fracture was sustained in the left femur. There was a fair degree of displacement, the shaft being displaced upwards and adducted. On July 15 a Smith-Petersen nail with a femoral shaft plate attached was inserted into the bone. On August 22 walking was commenced in a caliper, and by September 10, the day of her discharge from hospital, the patient was walking well in her caliper, and early union was present radiologically, the normal angle of the femoral neck being preserved. Dr. Webb said that this patient was of particular interest, for several reasons. Her liability to fractures of the femur was unusual; in spite of having had a fracture of the shaft of the right femur in 1945 and of the neck of the right femur in 1946 she had obtained sound union in both. The pertrochanteric fracture of the left femur sustained in 1947 had every promise of a sound union. In connexion with that type of fracture, the use of a combined Smith-Petersen nail and bone plate had helped to lessen the incidence of *coxa vara*. Another point was that the Smith-Petersen nail in the right femoral neck was made of vitallium; the combined plate and nail on the left side was made of stainless steel. The present proposal was to leave both of them in position and to note any reaction.

Dr. Webb finally showed a female patient, aged sixty-four years, who had fractured the neck of the left femur on December 2, 1944. A Smith-Petersen nail was inserted a day or two later. The fracture did not unite, and a subtrochanteric osteotomy was performed and a hip spica applied which was kept on for eleven weeks. Dr. Webb said that the patient was shown in order to demonstrate the late end result which might be expected in cases of fractured neck of the femur when the operation for insertion of a nail had failed. This patient said that she could do a day's shopping without disability. She rode in public conveyances without trouble. She walked with a hardly perceptible limp and had an excellent range of movement at the hip and knee joints, which she demonstrated by the ease with which she took off and put on her left shoe. The inability to do that was a great disability to people who had had a subtrochanteric osteotomy and in whom the hip disability had been complicated by the stiff knee which so often followed spica immobilization.

Dr. Webb explained the essential features of the subtrochanteric osteotomy operation, and emphasized what a wonderful boon it had proved in cases of non-union of fractures of the neck of the femur.

Correspondence.

COMPLETE PHYSICAL FITNESS.

SIR: Your leading article on physical fitness with special reference to military service is one which will certainly call for some congratulation. An accurate selection of candidates for the services, apart from its fundamental importance as an aid to military success, is a factor which seriously influences the cost of a war both before and after cessation of hostilities.

In no medical field are these observations more pertinent than in medical psychology, as has been shown especially in the 1939 war. You observe: "It is equally important that psychological evaluation should include an appraisal of the

total personality." In this connexion I would respectfully call your attention to something which although neglected in the past is going to prove of great value in the future, and that is the school record.

Just before the 1939 war the school medical records were being absorbed in Britain into the national health medical record when the adolescent chose a doctor under the National Health Insurance Scheme. During and after the war some of the education committees of the local authorities had begun to keep psychological records as well as medical records, especially those which had child guidance clinics such as Surrey, Southend and Glasgow. The burgh of Southend in particular has a very effective record of every pupil's psychological attitude to the school subjects and to abnormal situations.

In an efficient local authority the transfer of these records or a copy of them to national health insurance or labour or military service dossiers is a matter of simple routine.

To ask a medical board or psychiatrist to appraise the psychological state of a candidate's personality is a request which must be based largely on generalizations. Accurate assessment of personality took the army psychologists about a week to perform in the choice of officers. How impossible such a course would be in initial selections of large numbers is obvious.

The history is of paramount importance and candidates often do not tell the truth. A man may look very well superficially, yet have a seriously damaged personality, say by the shattering blow caused by the death of his mother before his fifth birthday. His school record would show evidence of this and more and is of much greater value than isolated psychological tests.

Yours, etc.,

JOHN A. McCLUSKIE.

Repatriation Department,
Perth,
September 24, 1948.

SINUSITIS AND SHORT-WAVE THERAPY.

Sir: I regret that I cannot give a scientific discussion on the important subject of nasal sinus disease instead of some rather rambling expressions of personal opinions, but I have endeavoured to consider the subject from a rational viewpoint.

Nasal accessory sinus disease is one of the commonest of morbid conditions affecting mankind, particularly in Australia, and is notoriously difficult to treat satisfactorily and is often difficult of diagnosis. An understanding of its true nature is essential.

It is not very long since Dr. T. B. Layton, one of England's then senior rhinologists, was reported in the *British Medical Journal* as admitting that he did not know what constituted sinusitis.

We do know that nasal sinus disease is a morbid condition affecting the lining membrane of the sinuses, which is manifested in various ways and is frequently present without any obvious symptoms.

It is not authoritatively known that it is merely the result of infection—acute or chronic—although it is frequently alleged to be the result of repeated infections, as repeated colds. However, it is perhaps more reasonable to ascribe the occurrence of repeated colds *et cetera* as being due to the presence of nasal sinus disease.

Years of experience, particularly in a hospital for sick children, have convinced me that nasal sinus disease is not just a local disease caused by infection, but is a local manifestation of a familial constitutional biochemical dysfunction which is particularly susceptible to infection as its powers of resistance are low. It is invariably associated with some other disorders which may be of very varied nature, including psychotic symptoms. One of these disorders, namely, bronchiectasis, is most certainly a condition based upon an abnormality of structures of epithelial origin which is essentially of the same pathological nature as the condition of the lining membrane of the sinuses which is developed from the same embryologic tissue. The many conditions (including vertigo, Ménière's syndrome, urticaria, eczema, otitis externa and other skin conditions, dyspepsia, some idiopathic epilepsies and many other disorders) will be noted as arising in tissues which have the same embryologic origin and occur in people and families with this biochemical dysfunction which I call an "allergic diathesis". Epithelioma of the nasal sinuses appears to develop from this abnormal or degenerated membrane. Cannot this be considered in connexion with dermal hyperkeratosis, sug-

gesting that the abnormal biochemical dysfunction referred to may be a factor in the cancer problem?

This similarity in embryologic origin gives an explanation for the favourable results sometimes following upon prolonged administration of vitamin A. Again the supposition that calcium metabolism is also at fault is the reason for combining vitamin D with vitamin A.

Dr. Wilkie Smith (THE MEDICAL JOURNAL OF AUSTRALIA, August 17, 1948, page 81) states: "In practice no sooner is lavage of the sinus over than the patient commences sneezing. A fresh cold has developed and pus is secreted into the sinus as copiously as ever." In all my years of practice I cannot recall a single instance where this has happened.

Furthermore, although I avoid surgery as much as possible, I know that, sinus disease being a disease of the lining membrane, the disease does not recur in that particular sinus, such as a maxillary antrum, once the lining membrane is completely removed and efficient permanent drainage has been established; this being the essential feature of radical sinus surgery, that particular sinus will not cause further trouble.

Unfortunately, however, except in the comparatively rare cases of accidental sinus infection as from a tooth or other foreign body, since it must be realized that the basic abnormality is present in all the sinuses, symptoms may often be reproduced by other of the sinuses, and those who do not know or do not think almost invariably put the blame on "the old antrum".

On account of the susceptibility of the diseased mucous membrane to infection, penicillin is a very valuable adjunct to sinus surgery; it not only improves the end results, but by inhibiting the inflammatory reaction from operation trauma it greatly lessens tendency to hemorrhage and post-operative discomfort and pain.

Diagnosis of nasal sinus disease is not a matter for X ray, nor the observation of discharge from the ostia of one or more sinuses. It is a matter which entails a very careful examination of the patient including a thorough medical and family history, aided by X rays and other appropriate techniques.

With regard to X ray, the usual X-ray report is confined to the contents of the sinus, but of almost equal importance is the size of the sinus and the nature of the bony walls.

The large "expanded" type of nasal sinus with thin bony walls and often no X-ray evidence of thickening of the mucosa or the presence of secretion is almost pathognomonic of chronic nasal sinus disease, and if the surgeon opens an antrum in such a case he will probably find a very thin lining membrane, but one which is completely degenerated and which will strip out from the cavity like a glove. This is the membrane which secretes a thin, clear (sometimes yellowish), watery fluid which is very irritating and which causes pronounced allergic symptoms, such as paroxysmal sneezing and asthmatic attacks.

I avoid the term "sinusitis" because it infers the presence of inflammation, and in many of these cases few, if any, of the classical signs of inflammation are present, the condition being the very reverse of inflammatory, but an acute infection resulting in suppuration will sometimes greatly benefit such a sinus.

I am convinced of the truth of three statements:

1. Nasal sinus disease, apart from cases of accidental infection from injury, foreign body, tooth, malignancy *et cetera*, if present in one sinus is present in all, but frequently varying widely in degree in the different sinuses, this, of course, being the explanation for the so-called failures of nasal sinus surgery.

2. In the majority of cases of chronic nasal sinus disease which cause symptoms, the lining membrane is so completely degenerated that no local treatment can restore it to a normal healthy condition.

3. In chronic nasal sinus disease systemic treatment is always called for and is frequently of much greater importance than local treatment.

Much of the popular criticism of sinus surgery is based upon want of knowledge of the nature and progress of the disease and failure to understand the rationale and principles of such surgery.

It must first be realized that the morbid condition to be dealt with lies in the lining membrane.

For a particular sinus, if this membrane be removed (which is the essence of the operation) the disease is removed as surely as in the case of a diseased appendix, but difficulties are inherent in the anatomical structures; in a sinus when the lining membrane is removed the cavity has rigid bony walls which prevent the obliteration of the cavity, and unless satisfactory permanent drainage is pro-

vided true infection of the cavity may occur and further trouble arise. This has for years been the problem connected with frontal sinus surgery, namely, to obliterate the cavity or to provide adequate and permanent drainage.

Owing to its complex anatomy and proximity to intracranial structures the ethmoid has been a problem, for unless all the cells are well opened operative trauma may introduce or cause the spread of infection. Today we have the advantage of penicillin which greatly lessens our difficulties.

I do not think that there are many conditions which call for the judgement and experience which are so necessary to decide when to operate and to what extent as are called for in nasal sinus surgery. This judgement will be at fault unless the true nature of the disease and its origin are realized. The basic features are that nasal sinus disease is only a local manifestation of a constitutional condition. It is familial and congenital. If one sinus be involved all are involved to varying degrees.

I would like to ask Dr. Wilkie Smith to give his description of "sinusitis" and its origin and the rationale of treatment by short-wave therapy of the various nasal accessory sinuses. I would like to know how the "short wave" traverses or passes around the large air spaces present in the sinuses.

It is a matter for serious regret that much of the criticism of nasal sinus surgery is based upon lack of knowledge, failure to think and reason, distortion of facts, and prejudice, even by those who should know better. If I may have the space I will quote one case illustrating this. A young man consulted me; I advised radical operation on his maxillary antrum. He declined because "it never did any good". In reply to a question as to how many of such cases he knew personally he replied "lots". I endeavoured to nail him down to some approximate number and eventually he claimed to know five or six. I then challenged him to produce any of them and offered a wager of five pounds to five shillings that I would convince him and the patients that they were at least improved. He did not take me up, but said: "Well, I know one, a patient of yours." I asked the patient's name, which he gave me. I then produced the card on which was my note to the effect that the patient declined the operation. No wonder he got worse.

The truth of the matter is that these "failures" occur in those patients where the condition has not been recognized early enough and treatment—radical or conservative—has been too long delayed.

Yours, etc.,
ERNEST CULPIN.

Ballow Chambers,
Wickham Terrace,
Brisbane.
Undated.

AN ADVENTURE IN IMPORTATION.

Sir: I was particularly interested in the account of "An Adventure in Importation" as relating to BCG vaccine obtained from Montreal and recorded by E. H. R. Ebbs in your issue of September 18, 1948.

The Department of Health in Melbourne is to be congratulated on its persistence and determination in overcoming all obstacles to the importation of this vaccine, and on the successful use it has made of it. Apparently the department was not aware that just as good, perhaps even a better vaccine, was being produced in Adelaide just across the border. It is to be noted that the Mantoux conversion rate using the Montreal vaccine, with the exception of one hospital, was 86%. In Adelaide, under the supervision of a subcommittee of the Faculty of Medicine of the University, a vaccine is being prepared which is giving a Mantoux conversion rate of over 99%. None of the subjects vaccinated has come to any harm, most of them have felt nothing except slight itchiness at the site of puncture, the vaccination "takes" have been good but not excessive, suppuration and local glandular enlargement have been almost absent.

The multiple puncture method has been used in Adelaide, the punctures being made by a "gun" constructed in the Institute of Medical and Veterinary Science. The small papules produced have in most cases almost disappeared in three months. In cases re-tested, the sensitization has continued to be well marked for periods of over twelve months; indeed, in most cases the Mantoux reactions have become stronger with the passage of time.

The results attained in Adelaide have been very good indeed, and compare favourably with those reported in any part of the world. If the experience of other workers can

be relied upon, it would appear that the persons vaccinated with BCG in Adelaide have gained a considerable degree of protection against tuberculosis.

Yours, etc.,
163, North Terrace,
Adelaide,
October 8, 1948.
D. R. W. COWAN.

FIBROCYSTIC DISEASE OF THE PANCREAS: A REVIEW OF FOURTEEN CASES.

Sir: I have read with interest Dr. Adams's closely reasoned letter in which he argues that children with fibrocystic disease of the pancreas should receive one to two grammes of choline chloride per day. However, I feel that this, though harmless, is unnecessary, and that there are flaws in his reasoning. Thus he states that milk has low choline content, but that casein, when normally hydrolysed, has good lipotropic activity, probably due to its high methionine content. Does he regard milk as biologically inefficient for liver health? Surely not, or else my own children would have had fatty livers long ago. Moreover, Waterlow has recently reported in West Indies children that dietary liver disease is relieved by the administration of milk, but not by choline or methionine.

All that is required then in fibrocystic disease of the pancreas is to ensure that hydrolysis of the milk (and casein) occurs, either by Bengerization or by the addition of casein hydrolysates, which have become available since my article was written.

Moreover, let us not become too scientifically fussy over the health of these patients' livers, when after all it is the pulmonary infection that brings them to the grave.

Yours, etc.,
14, Alta Street,
Canterbury, E.7,
Victoria.
September 27, 1948.
DAVID B. PITT.

TINTED SPECTACLES.

Sir: Dr. Arnold Lance, in his letter, was not quite fair to me in his comment. He states:

I wish to call attention to the dangerous last paragraph of Dr. D'Ombrian's letter in which he advises practitioners to instruct their patients to procure the darkest spectacles obtainable through which to view the eclipse.

What I said was:

Of far greater importance is it for the medical profession to instruct such members of the public as are determined to expose their eyes to infra-red radiation at the forthcoming eclipse of the sun, to hasten to obtain the darkest coloured glasses obtainable.

In other words it is only those people who insist on looking at the eclipse of the sun that should be instructed to use some form of darkened glasses. With Dr. Lance's contention that it is better not to look at the eclipse at all, I am, of course, in complete agreement.

However, since Dr. Lance's letter has resulted in a comment in the *Daily Telegraph*, quoting his warning not to look at the eclipse at all, the result has been a happy one.

Yours, etc.,
135, Macquarie Street,
Sydney,
October 11, 1948.
ARTHUR D'OMBRAIN.

Naval, Military and Air Force.

APPOINTMENTS.

The following appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Number 142, of September 20, 1948.

AUSTRALIAN MILITARY FORCES. Interim Army.

Australian Army Medical Corps: Medical.

The following officers relinquish the temporary rank of Major and are transferred to the Reserve of Officers (Aus-

trallan Army Medical Corps): Captains (Temporary Majors) SX34383 N. D. G. Abbott (6th Military District), 9th July, 1948, and NX191425 D. D. Bathgate (2nd Military District), 13th July, 1948.

Australian Military Forces Wing Repatriation General Hospital, Concord.—NX203552 Captain (Temporary Major) P. W. H. Grieve relinquishes the temporary rank of Major and is transferred to the Reserve of Officers (Australian Army Medical Corps) (2nd Military District), 17th July, 1948.

Australian Military Forces Wing Repatriation General Hospital, Heidelberg.—SX22303 Captain P. R. James is transferred to the Reserve of Officers (Australian Army Medical Corps) (4th Military District), 23rd March, 1948 (in lieu of the notification respecting this officer which appeared in Executive Minute No. 93 of 1948, promulgated in *Commonwealth Gazette* No. 116 of 1948).

70th Camp Hospital.—NX207584 Captain (Temporary Major) R. J. M. Dunlop relinquishes the temporary rank of Major and is transferred to the Reserve of Officers (Australian Army Medical Corps) (2nd Military District), 6th July, 1948.

Active Citizen Military Forces.

Southern Command: Fourth Military District.

Australian Army Medical Corps (Medical).—The following officers are appointed from the Reserve of Officers, 1st May, 1948: Captains 4/31907 R. A. Burston, 4/31910 R. D. Hammill and 4/31911 F. E. Welch.

Southern Command: Third Division.

Australian Army Medical Corps (Medical).—The following officers are appointed from the Reserve of Officers, 1st May, 1948: Captains 4/31903 C. M. Gurner, 4/31904 P. S. Eyles, 4/31905 G. W. E. Aitken, 4/31906 M. W. Elliott, 4/31908 J. S. Skipper.

Reserve Australian Military Forces.

Australian Army Medical Corps (Medical).

5th Military District: To be Major, 23rd July, 1948.—William John Elliott Phillips.

Permanent Military Forces.

Australian Army Medical Corps (Permanent).

To be Major, 17th August, 1948.—NX102551 (NP9910) Captain J. R. Nimmo.—(Ex. Min. No. 112—Approved 23rd September, 1948.)

Obituary.

RICHARD DUNCAN DAVEY.

THE following appreciation of the late Dr. Richard Duncan Davey has been received from Dr. Kevin Byrne.

"Dick" was a decent, friendly little man. His first act on leaving Armidale High School was to enlist as a volunteer in the Australian Imperial Force for overseas active service in World War I, eventually fighting in France in the Thirty-Third Battalion, where as a second lieutenant attached to a trench-mortar section he was blown up and "shell-shocked" at Passchendaele. He was returned to Australia and shortly afterwards entered the University of Sydney in the Faculty of Medicine. On graduation he was for a short while a resident medical officer at Sydney Hospital, after leaving which he "squatted" in private practice at Croydon Park, Sydney. In 1930 he became an honorary medical officer to Canterbury District Memorial Hospital—the first "community hospital" in New South Wales. Eventually "Dick" specialized in the treatment of varicose veins and hemorrhoids by injection of sclerosing agents, his case book containing many thousands of entries. As a specialist in this work he entered Macquarie Street. His popularity with his colleagues rested on his ethical probity and a keen sense of humour. He had a queer hobby; interested in a diversity of subjects, he was an inveterate and clever anonymous newspaper correspondent to "letters-to-the-editor" columns of the lay Press. He never wrote anything of essential literary value under his own name or anonymously.

Poor "Dick" spent his last months on the veranda at Vaucluse. With a failing heart he could take no recreative exercise, so sought his amusement with a telescope trained

on the kaleidoscope of Sydney Harbour. Knowing nothing of ships or boats he felt at a loss, so I drew him some large diagrams of all types and rigs with annotations which helped to "unscramble" the harbour to his delight until he could no longer enjoy even that.

Australian Medical Board Proceedings.

NEW SOUTH WALES.

THE following additional qualifications have been registered:

Hambly, Colin Keith, 93, Mowbray Road, Willoughby (M.B., B.S., 1941, Univ. Sydney), D.T.R., 1948 (Univ. Sydney).

Johnston, Hugh Croft, Department of Public Health, Sydney (M.B., B.S., 1933, Univ. Sydney), D.P.H., 1948 (Univ. Sydney).

McDonald, Geoffrey Lance, Royal Prince Alfred Hospital, Camperdown (M.B., B.S., 1945, Univ. Sydney), M.R.A.C.P., 1948.

Rundle, Philip Alan, 57, Hunter Street, Newcastle (M.B., B.S., 1941, Univ. Sydney), M.R.A.C.P., 1948.

Tomlinson, Paul Angus, 5, Livingstone Street, Burwood (M.B., B.S., 1937, M.S., 1945, Univ. Sydney), F.R.A.C.S., 1948.

WESTERN AUSTRALIA.

THE undermentioned have been registered in pursuance of the provisions of the *Medical Act, 1922-1945*, as legally qualified medical practitioners:

Wiltshire, Richard Mallorie, M.R.C.S. (England), L.R.C.P. (London), 1937, Perth.

Phillips, William John, M.R.C.S. (England), L.R.C.P. (London), 1936, M.B., Ch.B., 1937 (Camb.), M.R.C.P., 1947 (London), Perth.

Thornton, John Wakefield de Witt Gray, M.R.C.S. (England), L.R.C.P. (London), 1926, B.M., B.Ch., 1929 (Oxford), M.R.C.P., 1933 (London), Perth.

Constable, Roy Keith, M.B., B.S., 1937 (Univ. Sydney), Bassendean.

Mylechreest, Douglas Herbert Parker Morgan Quayle, M.R.C.S. (England), L.R.C.P. (London), 1926, G.M.C. (Reg. Vert. No. 3384), Perth.

Ponting, George Edward, M.B., B.S., 1945 (Univ. Queensland), Perth.

Moffin, Lionel Hugh, M.B., B.S., 1948 (Univ. Melbourne), Perth.

McCracken, James Murray, M.B., B.S., 1941 (Univ. Melbourne), Perth.

Courtney, Thomas Richard Brian, M.B., B.S., 1935 (Univ. Melbourne), F.R.C.S., 1947 (Edinburgh), Perth.

Wilson, Lindsay Athol, M.B., Ch.B., 1943 (Edinburgh), Perth.

Beetles, Irene Muriel, M.B., B.S., 1929 (Punjab), G.M.C. (Reg. Vert. No. 7295), Perth.

Bibliography of Scientific and Industrial Reports.

THE following bibliographies, summaries of information and special reports have been prepared by the Council for Scientific and Industrial Research Information Service. Copies may be obtained on application to the Officer in Charge, C.S.I.R. Information Service, 425, St. Kilda Road, Melbourne, S.C.2. The bibliographies are, in the majority of cases, selective only. Applicants should state clearly the reason why the bibliography *et cetera* is requested, because the number of copies available is limited. In this list after the title the date of preparation is shown and, in parentheses, the number of references.

B307: "Preparation of liver extract for oral administration", November, 1947 (15); B344: "Study of teeth and saliva with radioelements", March, 1948 (39); B345: "Radioisotopes in embryology", February, 1948 (21); B346: "Study of muscle

with radioelements", February, 1948 (23); B347: "Application of radioelements to brain, nerve and sense organs", February, 1948 (11); B348: "Stable isotopes in absorption", March, 1948 (177); B352: "Use of radioelements for study of blood, circulation and respiration", May, 1948 (40); B356: "Application of radioisotopes to the thyroid gland", May, 1948 (21); B357: "Use of radioisotopes for blood disorders", May, 1948 (15).

Notice.

THE following notice is published at the request of the Victorian Police Department.

Medical practitioners are asked to notify the nearest police station if they are approached by a tall, grey-haired, well-dressed, affable man, about sixty years of age, who claims to be a medical practitioner suffering from sciatica. The person concerned is well known to the police, who desire to interview him concerning certain valueless cheques, and some of his numerous aliases are: "Dr. Mattland", "Dr. Munro", "Dr. Terry" and "Dr. Poate".

S. E. JONES MEMORIAL FUND.

THE following subscriptions to the S. E. Jones Memorial Fund have been received up to September 30, 1948.

	f	s.	d.
Previously acknowledged	176	0	0
Dr. S. J. Minogue	10	10	0
Dr. G. Wooster	7	7	0
Dr. D. W. H. Arnott, Dr. F. W. Graham, Dr. H. P. Greenberg, Dr. G. A. Lawrence, Dr. Morris, Dr. J. A. L. Wallace (£5 5s. each)	31	10	0
Dr. M. Finlayson, Dr. E. Kirkwood, Dr. G. U. Prior (£1 1s. each)	3	3	0
	£228	10	0

Cheques made payable to the S. E. Jones Memorial Fund should be sent in an envelope addressed to S. E. Jones Memorial Fund, c/o. Medical Secretary, British Medical Association, New South Wales Branch, 135, Macquarie Street, Sydney.

THE committee of the Medico-Legal Society of Victoria announces that the Stewart MacArthur Prize has been awarded to Miss Norma O'Connor, of the Women's College, University of Melbourne, for an essay entitled "The Control of Patent Medicines".

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Asher, Joan, provisional registration, 1948 (Univ. Sydney), St. George Hospital, Kogarah.
Harvey, Henry Peter Burnell, provisional registration, 1948 (Univ. Sydney), Royal Prince Alfred Hospital, Camperdown.

The undermentioned have been elected as members of the South Australian Branch of the British Medical Association:

Peters, Brian Harry, M.B., B.S., 1948 (Univ. Adelaide), 726, Seaview Road, Grange, South Australia.
De Bruin, Arthur James, M.B., B.S., 1945 (Univ. Ceylon), 142, Payneham Road, Evandale, South Australia.
Zimmert, Jacob, M.B., B.S., 1942 (Univ. Adelaide), Whyalla, South Australia.

The undermentioned has applied for election as a member of the South Australian Branch of the British Medical Association:

Anderson, Donald Robert Ross, M.B., B.S., 1947 (Univ. Adelaide), 313, Military Road, Semaphore, South Australia.

Diary for the Month.

- Oct. 26.—New South Wales Branch, B.M.A.: Ethics Committee.
Oct. 27.—Victorian Branch, B.M.A.: Council Meeting.
Oct. 28.—New South Wales Branch, B.M.A.: Branch Meeting.
Nov. 2.—New South Wales Branch, B.M.A.: Organization and Science Committee.
Nov. 3.—Victorian Branch, B.M.A.: Branch Meeting.
Nov. 3.—Western Australian Branch, B.M.A.: Council Meeting.
Nov. 4.—South Australian Branch, B.M.A.: Council Meeting.
Nov. 5.—Queensland Branch, B.M.A.: Branch Meeting.
Nov. 9.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
Nov. 11.—Victorian Branch, B.M.A.: Organization Subcommittee.
Nov. 12.—Queensland Branch, B.M.A.: Council Meeting.
Nov. 15.—Victorian Branch, B.M.A.: Finance, House and Library Subcommittee.
Nov. 16.—New South Wales Branch, B.M.A.: Medical Politics Committee.
Nov. 17.—Western Australian Branch, B.M.A.: General Meeting.
Nov. 18.—New South Wales Branch, B.M.A.: Clinical Meeting.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phoenix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute; Brisbane City Council (Medical Officer of Health). Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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